University of Alberta

Learning and Remembering in Dance:

A Quantitative and Qualitative Examination

by

Pauline Po Lam Poon

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment

of the requirements for the degree of

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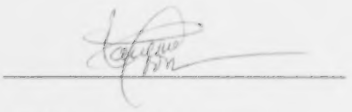

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **Learning Strategies in Jazz Dance: Quantitative and Qualitative Examination** submitted by **Pauline Po Lam Poon** in partial fulfilment of the requirements for the degree of Master of Arts.

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Abstract

The purpose of this research was to examine cognitive strategies used by advanced and novice jazz dancers when they are appropriately challenged. Study 1 represented the attempt to create different, yet, appropriately challenging routines for a novice and advanced group. Four routines were constructed by crossing the difficulty and complexity dimensions. Each video-taped routine was presented to dance instructors for validation. Results showed that two jazz routines (Easy and Difficult) were most appropriate for each group and were selected as the stimuli for Study 2. Eight novice and nine advanced dancers participated in Study 2 which allowed the dancers to learn and remember the dance routines according to 5 phases: learning, consolidation, recall (motor & verbal), strategy recall, and recall (motor). Quantitative performance accuracy results were scored according to 4 criteria: weight shift, direction, gestures, and rhythm. Statistical analysis demonstrated that both jazz dancers and instructors rated similarly on the overall challenge level of the dance routine. A significant Time x Routine interaction ($F(4,10)=16.11$, $p<.05$) indicated that while novice and advanced dancers performed similarly on the easy routine at time 1, advanced dancers performed better on the difficult routine at time 2. Encoding and retention strategies were analyzed qualitatively which indicated that both groups shared domain-specific strategies but the *extent* and *how* each group used those strategies were vastly different.

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INTRODUCTION

As you walk into any beginner dance class, one observation is the diversity of initial skill levels. Previous experience notwithstanding, the differences in performance level may be an indication that each individual learns in different ways and at different rates. With each person's uniqueness and the various stage of learning he or she is at, the influence of the instruction is never the same. Learning how to learn efficiently and effectively could mean less frustration and more enjoyment in the learning process, and a possible increase in content knowledge for some.

Being a dancer means continuous learning: steps, choreography, style, emotional interpretation, music, vocabulary...etc. Every class or performance demands a presentation of something new and something learned. This is what the expert dancers do during every day of their training. Starkes, Deakin, Lindley, & Crisp (1987) recited such a moment:

> While working at the National [Ballet] School, we were able to observe an adult principal dancer from the National Ballet company in the process of seeing and attempting to perform a new piece for the very first time. Following one demonstration and simultaneous verbal description of the piece by the choreographer, the dancer immediately was able to recall and perform all 96 steps. This was a routine learning situation, not an exceptional behaviour. (p. 229)

Beyond the physical advantages and talents that experts may have, it is uncertain whether experts possess more effective and efficient strategies or whether it is those who possess learn higher order strategies who become experts. Nonetheless, part of being an expert may include having such complex learning and remembering strategies. The purpose of

Study Two is to examine if, in fact, experts possess more elaborate strategies than novices and how challenge level can affect the use of strategies. To borrow Nagrin's (1988) observation of dancers:

> The good learner is challenged and juiced up by difficulty. A bad learner becomes a good learner by looking for the rough dance step, hoping to be given the chance to work on something substantial that will qualify him/her as a 'hotshot'. (p. 30)

"Rising to the challenge" gives most people the confidence to continue and the desire to be challenged even more in order to achieve further advancements. On the other hand, full potential may never be reached or realized if the right challenge level never presents itself. Having the appropriate challenge level, neither too much nor too little, may create an environment where one's skill can be nurtured in a positive manner. Relevant motor learning research in the domain of dance (Starkes et al., 1987; Starkes, Caicco, Boutilier, & Sevsek, 1990; Smyth & Pendleton, 1994) has used the same stimuli based on the novices' limitation and, thus, presented the expected result of a ceiling effect on experts' performance.

There were two main objectives to this research. Firstly, to develop and validate jazz dance routines which represented the novice and advanced level, in terms of challenge, and to validate such routines with dance instructors. Second, to use these appropriately challenging routines for each group to examine the cognitive strategies used during the learning and remembering of the dance routines.

If the dance routines selected represented the appropriate challenge level for each group, then it was hypothesized that the quantitative analysis of both the participants'

performance and rating of the routines would reflect such appropriateness. That is, the advanced dancers would perform better than the novice dancers on the difficult routine, and novice dancers would perform better on the easy routine than on the difficult one. The advanced dancers should also perform better than the novice dancers on the easy routine given their expertise. Both groups should rate their respective routine as neither too easy or too challenging on a scale of 1-9.

The qualitative analysis of the strategies used by both groups is hypothesized to show that advanced dancers would not only have different learning strategies than novices but, these strategies would also be more jazz dance specific. When advanced dancers are appropriately challenged, they will use more elaborate strategies. These would be typical strategies normally used in appropriately challenging learning situations. Conversely, atypical strategies may be used when faced with non-challenging routines. Finally, novices would use similar strategies for the appropriately challenging routine and for the one that surpasses their normal challenge level.

Purposes

The purpose of this research was to examine the strategies used by novice and advanced jazz dancers under appropriately challenging conditions. The primary purposes of Study 1 were: (1) to develop four jazz routines by crossing two dimensions: difficulty and complexity; (2) to present these routines to dance instructors for validation of the overall challenge level; and, (3) to quantitatively determine and select the most appropriate dance routine for each group on the basis of the ratings generated by the

instructors . The purposes of Study 2 were: (1) to quantitatively assess the performance accuracy of novice and advanced dancers for both routines; and, (2) to qualitatively understand the strategies used to learn and remember the dance routines.

Significance of the Study

The notion of expertise has been investigated throughout various domains such as chess (Chase & Simon, 1973), music (Chase & Ericsson, 1981; Sloboda, 1991), computer programming (Adelson & Soloway, 1988), and physics (Anzai & Yokoyama, 1984; Anzai, 1991; Clement, 1982). It has also been highlighted in the motor domains of basketball (Allard, Graham, & Paarsalu, 1980), field hockey (Starkes, 1987), figure skating (Deakin & Allard, 1991), and dance (Starkes, et al., 1987; Starkes, et al., 1990; Smyth & Pendleton, 1994). Yet, the relationship between motor skill learning and the learning strategies used by experts and novices has not been considered to any great extent. Even fewer studies regarding dance skills and sequences have focused on strategies used during learning. The investigation of learning strategies may reveal further information on expert-novice differences. As noted by Starkes et al. (1987):

> The difference in strategies between the expert and novice children was particularly interesting. After viewing each sequence, novices rushed to perform or verbalize what they had seen. The experts inevitably asked if they could think about the sequence before performing it. During this very brief consolidation or rehearsal time they used small hand and foot movements to represent elements, and on rare occasions verbally labelled different steps. This consolidation seemed critical to the expert children. (p.227)

Empirical studies (e.g., Abernethy, 1987; Starkes & Deakin, 1984; Starkes et al.,

1987) of motor expertise have clearly indicated the presence of expert-novice differences in performance with situation or domain specific stimuli, as opposed to the slight differences found with non-task-specific stimuli. Traditionally, within motor expertise research, the same sequences or tasks have been presented to both expert and novice learners. Given the more advanced knowledge and skill level that experts possess, it is reasonable to infer that a manageable task for novices is not a challenging one for experts. Poor ecological validity in the dance learning research has also lessened the potential contribution of useful knowledge to the literature regarding the expert-novice paradigm. Abernethy, Thomas, & Thomas (1993) stated the importance of examining expertise in a situation specific context:

> Simplistic/contrived tasks may largely negate the expert's advantage by (a) removing from the task the experiential basis for the expert's advantage, (b) introducing potential floor (or ceiling) artefacts in measurement, and © causing experts to function inefficiently by either denying them access to the dedicated special-purpose processors developed with experience, or causing them to use such processors for tasks other than those for which they were developed. (p.329)

It is also possible that the experts are insufficiently challenged by overly simplistic or contrived tasks, resulting in the use of alternative strategies from those they would employ for more challenging tasks. In order to allow both expert and novice groups to demonstrate the processors used in the learning of dance sequences, the primary purposes of Study 1 were to develop ecologically valid dance routines and present different, yet, equally challenging choreographed jazz dance routines to dance instructors for validation of their overall challenge level. By selecting the most appropriate routines

for each group, thereby eliminating the floor or ceiling effect, the information gathered in Study 2 reflected a more accurate and representative understanding of the use of learning strategies by both expert and novice dancers.

Study 2 will also address the methodological issue of what constitutes a dance element. Starkes (1993) acknowledged this difficulty in motor versus digit recall:

> While it is true that digits may be made up of lines, angles, etc. it is fairly well accepted that a string of 8 digits has eight elements. But what constitutes a movement element? A dance step may involve foot, arm, hand and head placements, body elevation, and attitude. When a dancer recalls one step is it necessarily one element or an "inherent chunk" already comprised of several inseparable elements. All of these issues make the assessment of motor recall difficult but far from uninteresting. (pg. 9)

Due to the difficulty in identifying and defining what an "element" should contain, the criteria selected to represent performance accuracy were gross categories and not an all-inclusive scoring scheme that exhausted all of the qualities in which dance performance could be judged. For instance, the weight shift criteria included elevations, and gestures included the element of isolation. The direction criteria consisted of direction of specific movements such as rotation and overall directional pattern of the sequences.

Delimitations

1. Group (novice-advanced) and Routine (difficult-easy) were the independent variables.
2. Performance accuracy as measured by four categories (weight shift, gestures, direction, and rhythm) was scored by the investigator and served as a dependent variable.

3. Challenge level (1-9) of each routine was a dependent variable.

4. Interviews conducted to inquire about the strategies used to learn and remember the routines served as dependent variables.

5. Only female dancers were used. The results from this study pertain only to this group.

6. Specific guidelines (see Definitions) were used to select novice and advanced jazz dancers aged 16 and above.

Limitations

1. An elite professional dance performer (the model) performing the routines was video taped and then presented to the participants. Some ecological validity of having a "live" instructor demonstrating the routines easy relinquished in order to increase internal validity of the study.

Definitions

Advanced jazz dancer: Someone who has mastered jazz techniques and performance at an intermediate/high level as defined by her usual instructor. Such a dancer was also able to accomplish jazz techniques such as: chaine fan kick layout, triple pirouettes...etc. The dancer may have had dance knowledge in other forms of dance. She had at least 3 to 4 years of jazz dance experience.

Novice jazz dancer: Someone who was in a beginning or entry level jazz class as defined by her usual instructor. The dancer may have had limited prior dance knowledge in other forms of dance, however, her jazz dance knowledge and technical skills were minimal.

LITERATURE REVIEW

Motor learning paradigms have stemmed, by and large, from the theoretical and methodological framework of cognitive psychology. The pattern-recognition paradigm was used in chess studies by de Groot in 1965, 1966, and Chase & Simon in 1973 (see Abernethy et al., 1993) to highlight the expert advantage with familiar and domain specific structured information. Experts and novices had similar recall when the domain specific characteristics were removed. Therefore, this suggested that "expertise is a product of encoding strategies rather than overall memory capacity" (Abernethy et al., 1993). Yet past literature has not focused on the exploration of what these strategies are and how they distinguish experts and novices.

The knowledge-based paradigm assumes that the expert-novice difference lies in declarative knowledge (*what* they know), and procedural knowledge (*how to* do something), and not cognitive abilities. Previous studies in the expert-novice literature have demonstrated that the experts' advantage was present only in domain-specific information (Bjorkland & Zeman, 1982; Chase & Simon, 1973; Chi & Koeske, 1983; McFarland & Rhodes, 1978) . Procedural knowledge, which is domain-specific, included both movement selection and execution. As there are procedures in selecting the appropriate response given a number of decision choices, there are also procedures in the execution of movements. These procedures are perceived to be unique characteristics of certain domains. Apart from declarative and procedural knowledge, strategic knowledge has been defined as "rules, concepts and strategies which are generalizable across a

number of different domains" (Abernethy et al., 1993). Cognitive strategies that have been generated based on the characteristics of a particular domain, have largely been ignored in the area of research.

Only a small amount of literature has investigated the learning of a motor skill with the purpose of understanding the strategies used to learn and remember the presented motor movements. The area of dance and the strategies used to learn dance movement, have not been a focus in past research studies. Motor tasks which have been presented in traditional motor learning research have lacked ecological resemblance of "real world" tasks. Simple movements, such as those in linear positioning and pursuit tracking, are contrived laboratory tasks. These movements do not address the imperative skill acquisition question of the linkages between perception and action nor the problem of co-ordination found in "real world" tasks (Abernethy et al., 1993). Clearly, tasks which more closely mimic those found in the natural environment provide more useful knowledge regarding learning information. The inclusion of tasks which possess greater ecological validity are increasingly familiar to empirical studies of motor expertise (Abernethy, 1990; Allard & Starkes, 1990; Starkes et al., 1987; Starkes et al., 1990; Vickers, 1986).

One pivotal study in the area of dance and the learning of dance movement was conducted by Starkes et al. (1987) in which motor versus verbal recall by expert and novice ballet dancers was examined. In experiment one, videos of ten choreographed, structured sequences, and five unstructured sequences were presented. Each sequence comprised eight elements. The structured sequences were professionally choreographed

while the unstructured sequences were constructed randomly from the eighty elements within the structured sequences. Both expert and novice groups were age and experience matched. The highly skilled dancers were all students of the National Ballet School, while the novice group consisted of students from two local ballet schools. Participants were asked to recall the sequence under three conditions: motor and verbal recall of structured sequences, and motor recall of unstructured sequences. The authors hypothesized a relationship between skill level and structured information with higher probability of recall of the structured sequences by the experts.

Results of Starkes et al. (1987) study indicated that structured sequences led to enhanced performance for both expert and novice groups, particularly for the skilled dancers. Slightly but lower probability of recall was found in both groups for the unstructured sequences. These results corresponded to the findings of pattern-recognition studies.

Music was found to be a recall enhancing factor in the second experiment of Starkes et al. (1987). With a method similar to experiment one, the authors found that both music and no music conditions yielded a ceiling effect in recall for the experts. A significant difference was discovered in the last serial position where the condition with music had better recall than the no music condition. This study showed that music provided a cue in recall of up to eight elements for both groups.

An assumption of the Starkes et al. (1987) study was the equal strategic knowledge possessed by both experts and novices, as well as the advanced content knowledge of the experts. Yet, an interesting observation led the researchers to discover

that different strategies were employed by experts and novices. Notably, experts "marked" the movements by using small hand and foot movements to represent the actual presented movement. This was in addition to the use of verbal labels to consolidate the sequences. Conversely, novices hurried to verbalize or perform the sequence immediately after the video presentation.

A similar study by Starkes et al.(1990) examined motor recall of creative modern dancers. Previous study by Starkes et al. (1987) manipulated structure of the stimuli, which acted as an independent variable, as the differences in recall by expert and novice ballerinas. Starkes et al. (1990) hypothesized a lack of skill-by-structure interaction with modern dancers. The nature of creative modern dance often does not have distinct and explicit movement patterns, therefore, it resembles unstructured movements. Expert modern dancers, therefore, who have had extensive experience with unstructured movement patterns should, in fact, perform equally well under both structured and unstructured conditions.

Seven dancers (mean age = 21.4 years) with an average of 7.2 years experience in various dance forms were defined as experts (Starkes et al., 1990). Ten university physical education students with 24 hours of modern dance instruction served as novices. Video presentation of five structured and five unstructured dance sequences, with eight elements in each sequence, were presented without music. Results showed that, irrespective of the structure, experts had superior recall to novices. Both groups performed similarly to the structured and unstructured sequences. Starkes et al. (1990) concluded that memory structures for recall differed between creative modern dancers

and ballet dancers.

One study by Davenport (1993) that examined modern dancers' learning strategies had preconceived categories of such strategies. In order to develop a verbal behaviour catalogue which would represent all possible vocalizations of technique instructors within modern dance, Davenport (1993) assumed that the expectations of dance students existed in four areas: a) watch the teacher, b) listen to the teacher's voice, c) be sensitive to their own motor coordination and creative or emotional impulses, and d) self-correct while they dance. A further assumption made by the researcher was that there are five types of dance learning strategies: visual, aural, kinesthetic, expressive, and cognitive. The teacher's verbal instruction should reflect these five areas.

Davenport (1993) had entered the research study with the assumptions of the kind of learning strategies expected from the learner. Rather than beginning with such assumptions, the purpose of the present study was to understand and explore the learning strategies used by expert and novice dancers. Inductive analysis guided the categorization of the learning strategies.

Similar to the observational learning of dance routines in the present study. Gray, Neisser, Shapiro, and Kouns (1991) demonstrated the importance of kinematic information and the role of music in the learning of ballet sequences. Two different dance sequences were presented to thirty-four university students who had no dance training. The video images of the dance sequences were presented under three conditions: a) kinematic with music, b) kinematic only, and c) static. Under the static condition, a video tape of 20 successive still images were selected from each of the initial recording of the

dances. The researchers hypothesized kinematic display, both with and without music, would lead to better performance than static displays. This was supported by the findings.

Gray et al. (1991) demonstrated that a key aspect of dance is the transitions of movements as opposed to end static positions. The *how* to get to certain positions is what dance is all about. Therefore, it is important to establish and develop appropriate stimuli that accurately reflect the true quality of dance.

STUDY 1

Development of Sequences

The researcher and an elite professional dance performer used two dimensions to develop and determine the overall challenge level of four jazz dance routines by manipulating two constructs: difficulty and complexity. Difficulty was dichotomized into easy - difficult, and complexity into simple - complex. The difficulty level of a dance routine was increased by adding elements such as elevations, rotations, isolation, and/or weight shift. For example, performing a double chaine compared to a single chaine would generate an increase in level of difficulty in a routine. Characteristics that could have been added to increase complexity included: gestures, number of movements per beat, space covered, chaining sequence(s) together, and change of direction(s). For example, a routine that included a simple jazz walk versus jazz walk with hip and arm gestures, double time, and changing directions reflected an increase in complexity. Components of the dimensions used in the research have been established by famous dancers, choreographers, and teachers such as Giordano (1975) and Mattox (Frich, 1983).

Four routines were constructed by crossing the difficulty and complexity dimensions resulting in:

Combination 1: Easy / Complex
Combination 2: Difficult / Simple
Combination 3: Easy / Simple
Combination 4: Difficult / Complex

The elite professional dance performer served as the model for the video-taping of these jazz routines. Each routine was video taped in two views: 1) Distanced view 2) Close-

up view. While the video camera remained stationary with the distanced view, the dancer was followed by the video camera with the close-up view. Both views had their own advantages with respect to the space and depth covered as shown by the distanced view, and the more detailed movements captured by the close-up view. The musical accompaniment was from Miles Davis "doo-bop" album, the selection was titled Chocolate Chip. It was chosen for its clear delivery of the beat of 4/4 time.

Validation of Sequences

Methods and Procedures

Participants. Three experienced jazz instructors were selected from local dance schools. All of them had previous experience teaching both beginners and advanced dancers. Information about the study (Appendix A), informed consent (Appendix B), and demographic information (Appendix C) were obtained from the participants before the study was completed.

Task. The participants were asked to view a videotape of dance routines (see procedures). A rating sheet (Appendix D) was used to rate the challenge level of each routine. After the completion of these ratings, instructors were asked to express the subjective guidelines they had used to determine the challenge level of each routine. Dimensions used by the researcher to determine the overall challenge level of each routine were then revealed (Appendix E). The instructors were then consulted regarding their opinions of the dimensions used by the researcher.

Procedure. Participants were asked to rate the overall challenge level of each of the four video taped jazz routines based on two perspectives: 1) How challenging is this

routine for advanced dancers? 2) How challenging is the same routine for novice dancers? (See Definitions for novice and advanced dancers)

The scale used to rate each routine ranged from 1 (not challenging) to 9 (very challenging) for both perspectives. Therefore, each routine was scored for both advanced dancers and novice dancers. Both distanced and close-up views were presented to the instructors. It was made clear that participants could have had either or both views, and/or any of the routines repeated as often as they wished throughout the ratings of the routines.

Statistical Analyses. Data was analyzed using the Statistical Package for the Social Sciences (SPSS). A 2 (Group (novice-advanced)) x 2 (Easy-Difficult) x 2 (Simple-Complex) MANOVA with repeated measures on the two dimensions (complexity and difficulty) used was performed to determine if the ratings of the routines were significantly different from one another. Tukey Honest Significant Difference was used as post hoc tests. Instructors' mean rating score for each routine was used to determine which routine has the most appropriate overall challenge level for each group.

Results

No Difficulty x Complexity interaction was found which demonstrated that the two dimensions used to develop and determine the dance routines differed. Analysis of Variance showed a significant main effect for Group ($F(1,4) = 61.54$, $p < 0.05$) which indicated that the instructors rated all of the routines to be more challenging for novice than advanced dancers. A significant main effect for Difficulty ($F(1,4) = 250.00$, $p < 0.05$) revealed that when adjusted for complexity, easy routines were always rated as less

challenging than difficult routines for both groups. Similarly, when adjusted for difficulty, a significant main effect for Complexity ($F(1,4) = 54$, $p < 0.05$) was found. That is, simple routines were always rated as less challenging than complex ones.

A Group x Difficulty x Complexity interaction ($F(1,4) = 10.29$, $p < 0.05$) indicated that when routines are difficult, adding complexity increased the overall challenge level for advanced dancers but not for novices. Figure 1 shows that there is a ceiling effect present for novices (D/S=8.3, D/C=9.0) for whom the difficult routines were rated as too challenging, regardless of complexity. Conversely, when routines are easy, adding complexity increased the overall challenge level for novices (E/S=3.0, E/C=5.3), but had no effect on advanced dancers (E/S=1.0, E/C=1.3).

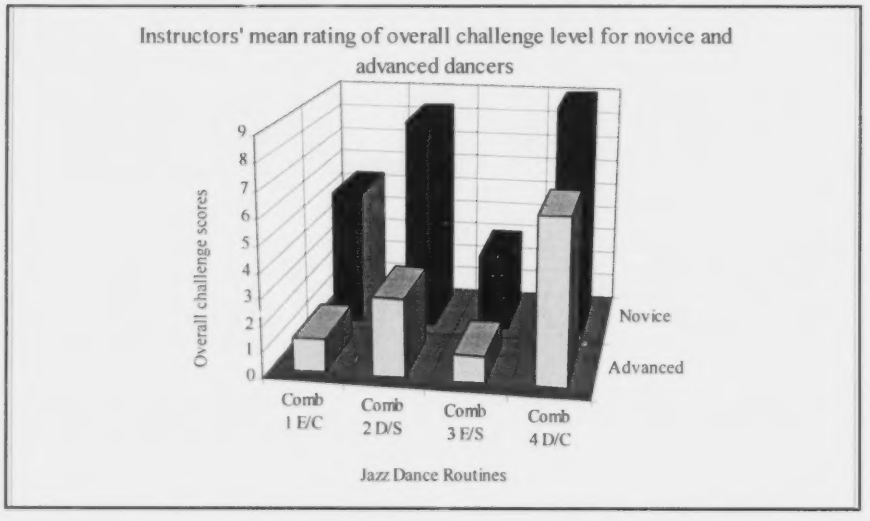

Figure 1. Jazz Instructors' mean overall challenge scores for each routine as intended for novice and advanced dancers.

The analysis of the instructors' mean scores for each routine indicated two routines that had similar, mid-range scores on the scale of one to nine. Combination 1

(Easy/Complex) had a mid-range average of 5.33 out of 9 as rated for novice dancers. Combination 4 (Difficult/Complex) had an average of 6.33 out of 9 as rated for advanced dancers.

Discussion

This study was designed to develop four jazz routines according to two dimensions: Difficulty and Complexity. In order to validate the overall challenge level of the routines, three experienced jazz instructors rated the overall challenge level of the routines for novice and advanced dancers (see definitions). From the instructors perspectives, a significant Group x Difficulty x Complexity indicated that the dimensions, difficulty and complexity, affect each group differently. The analysis suggested that an increase in complexity would affect novice dancers only when the routines are easy. However, the same increase in complexity would affect advanced dancers only when the routines are difficult.

The analysis showed that two jazz routines shared a similar overall challenge level for novice and advanced dancers. Combination 1 (Easy / Complex) was rated as having the most appropriate (5.33) overall challenge level for novice dancers and combination 4 (Difficult / Complex) was rated as having the most appropriate overall challenge level for advanced dancers(6.33). Thus, the "simple" routines were eliminated and not considered for further study. Therefore, the two remaining routines easy/complex and difficult/complex will simply be referred to as "Easy" or "Difficult" routines and will be used in Study 2 (Appendix F and G).

STUDY 2

Purpose

Based on the premise that when presented with appropriately challenging routines, the strategies used by dancers provided a more accurate representation of their skill level. Thus, allowing for a more valid comparison of strategies. The two jazz routines that were validated to have a similar overall challenge level were used to further the study of learning strategies. Stimuli that are too difficult or too easy are hypothesized to generate learning strategies that are atypical of the learners. From an ecological perspective, this study presented an attempt to go beyond the designs of previous studies by using different, yet, equally challenging dance routines as stimuli for novice and advanced dancers. Therefore, the purpose was to examine what strategies would be used by dancers when they were appropriately challenged by the stimuli. This study addressed the following questions:

1. What strategies are used by novice and advanced dancers to learn dance routines when the dancers are appropriately challenged?
2. What strategies are used by novice dancers during the learning of dance routines that are too challenging?
3. What strategies are used by advanced dancers during the learning of dance routines that are not challenging?

Methods and Procedures

Participants

Based on the guidelines used to define advanced and novice dancers (see Definitions), eight novice and nine advanced female dancers volunteered for the study. Information about the study (Appendix H), informed consent (Appendix I), and demographic information (Appendix L) were obtained from participants who were over 18 years of age. For those participants who were under 18 years of age, a separate letter to their parents or guardians (Appendix J), and informed consent (Appendix K) which required both the participant and her parent's or guardian's consent were obtained before the study was completed.

The novice group (M age = 22 years) was selected from the University of Alberta credit course jazz dance class, and the jazz division of the University of Alberta Orchesis Dance Club. This group had an average of 7.8 years of jazz experience, 6.25 years of ballet experience, 4 years of tap experience, and 2.5 years of modern experience. The advanced group (M age = 17.63 years) was selected from various local dance schools including The Edmonton School of Ballet, Alberta Ballet School, and Lecky's School of Dance. This group had an average of 9.25 years of jazz experience, 10.25 years of ballet experience, 4 years of tap experience, and 2.25 years of modern experience (Table 1).

Table 1
Means and standard deviations of novice and advanced dancers' age and dance experiences.

	N	Mean	SD
Novice	8		
Age		22.00	4.31
Jazz		7.88	5.03
Ballet		6.25	4.50
Tap		4.00	7.01
Modern		2.50	3.30
Advance	9		
Age		17.63	1.19
Jazz		9.25	3.92
Ballet		10.25	3.73
Tap		4.00	4.14
Modern		2.25	1.28

Apparatus

Two video taped jazz routines (approximately 30 seconds each), Easy and Difficult, were chosen for this study based on previous work in Study 1 to validate these jazz routines for their appropriate overall challenge level for novice and advanced dancers.

The same professional dancer served as the model in these two routines. The same musical accompaniment, "Chocolate Chip" from the Miles Davis "doo-bop" album, which is 4/4 time, was used for the jazz routines and recorded separately onto an audio tape which was used by the participants.

A 20 inch Sony Trinitron monitor and a Sony SLV 400 VCR machine with remote control were used to present the dance routines. The remote control had regular

control functions in addition to a slow motion function and an adjustable slow motion dial with the capability of playing the video at 1/5 of regular speed. A video tape of unrelated materials was used by the participants to become familiar with the various remote control functions. A Samsung RCD-830 stereo system was used to play the audio tape of the music. Two video cameras were used to record the participants throughout the duration of this study. An Olympus VHS Movie VX-403 camera was used to record a stable distanced view of the entire marked spaced (6 x 5.8m) used by the participants. A Panasonic VHS camera was used to follow and record a close-up view of the participants' movements. A Panasonic S-XBS walkman with a clip-on microphone was used to record verbal recall and interviews. A fanny pack, which was worn by the participants, was used to contain the walkman.

The study was conducted in a dance studio at the University of Alberta Van Vliet Centre. The dance studio was a converted squash court with a ballet bar. No mirrors were present in the studio.

Procedure

In a within subject design protocol, both groups were presented with the same two jazz routines. The viewing order of the routines was counter-balanced across participants by randomly selecting half of the novice group to view the Easy routine first, and the other half viewing the Difficult routine first. Because the number of advanced dancers was unequal, four advanced dancers viewed the Easy routine first and five advanced dancers viewed the Difficult routine first.

The participants were exposed to five study phases (learning, consolidation, recall

(motor and verbal/motor), strategy recall, and motor recall) for each presented routine. Instructions were explained to the participants before the onset of the study along with an opportunity to familiarize themselves with the remote control of the video machine until they felt that they were ready to begin. All participants were given the option to perform warm-up exercises as needed.

The participants were video taped by two cameras during the learning and consolidation phase. One was an elevated stationary camera designed to capture the entire marked space used by the participant, while the other "eye-level" stationary camera was designed to produce a close-up view of the participants by following their movements. The participants' behaviours were recorded and used as part of the qualitative analysis to interpret how they learned and remembered dance routines.

The participants' motor recall of the routines was also video taped by both cameras. The video taped information gathered was used as data in the quantitative accuracy evaluation of the participants' performance. The verbal/motor recall of the routines was audio and video taped only by the camera with the elevated view. Verbal recall was transcribed and analyzed for discrepancies against the content of the participants' physical performance (motor recall).

The strategy recall phase (interview) was audio taped. Only the "eye-level" camera was used to video tape this phase. The content of the audio tape was transcribed and used as data for the qualitative analysis of the strategies used by the participants to learn and remember the dance routines. The video taped interviews were used to augment the content of the audio tape by way of examining the participants' body

language.

Learning phase. Participants had 15 minutes to learn each video-taped jazz routine with the goal of performing it as best they could at a later time. Each routine was presented from two views: distanced view, with information regarding the space and depth covered by the model, and close-up view, with details of the model's movements. Both views were continuously repeated one after the other on the video-tape available to the participants. The subjects were free to select each view as frequently as they wanted. The participants also had the options to manipulate the viewing conditions with the remote control (e.g. slow motion, pause, stop...etc.), and the volume of the music on the television without restrictions. Movements were not restricted within the marked space.

Consolidation phase. Following the 15 minutes, the video tape was stopped and the participants had three minutes of free time with the option of playing the music only. The same segment of music used on the video-taped dance routines was recorded continuously on the audio tape and could have been played with the stereo system. The participants could adjust the volume of the music freely. Movements were not restricted within the marked space.

Recall Phase. I) Motor recall: At the end of the three minutes, participants were asked to perform the routine once with the music. They were instructed to do the best that they could regardless of whether they felt they were ready to perform at that time. II) Verbal/Motor recall: Participants were then asked to "walk through" the routine using both verbal descriptions and motor demonstrations. No music nor time restrictions were present. The participants were instructed to verbally recall everything they could about

the routine, regardless of whether they had actually performed it previously or felt they were even capable of performing it. The purpose of the verbal recall was to allow the participants to demonstrate the effect of learning even if some movements were too challenging to perform physically.

Strategy Recall phase. Participants were asked to describe how they learned and remembered the dance routine through an interview. The average length of the first and second interviews were 22.45 and 29.14 minutes, respectively, for the novice dancers, and 24.44 and 24.67 for the advanced dancers. Exploratory semi-structured interviews were adopted for the purpose of examining the issue of strategies used for learning and remembering of the dance routines. Two basic questions pertaining to the purpose of this research were used as guidelines during the interviews: How did you learn the dance routine? How did you remember it? Even though the opportunity to understand how informants structured this topic themselves was lost, the trade off with semi-structured interviews was that "comparable data across subjects" (Bogdan & Biklen, 1992) was gained. Informants were invited to talk about their experiences freely without any judgements or any "right" or "wrong" answers.

This qualitative approach was adopted from phenomenological research, which aims to study lived experiences and the essences of a phenomenon. Phenomenology strives to "come to a deeper understanding of the nature of meaning of our everyday experiences" (Van Manen, 1984). Consistent with this view point, the present research strives to understand not only what strategies were used to learn and remember dance routines, but the meanings attached to these strategies. Therefore, the usual probing

method to acquire additional information was employed and the participants were asked to explain the meaning behind how certain strategies were used.

Motor Recall Phase. Participants were asked to perform the routine with music at the end of each interview. The purpose of the second motor recall was to examine whether the first motor recall was simply the result of short-term memory and not representative of actual learning of the dance routines.

Challenge Rating. A 9-point rating sheet (Appendix M) was used by the participants to rate the challenge level of each routine after the last motor recall. The purpose of this procedure was not only to assess the participants' rating of the overall challenge level of each routine and, thus, validate the routines from their perspectives, but also to compare their ratings to instructors' ratings of the routines in Study 1.

Quantitative Measurement Tools

Accuracy of recall was scored according to four criteria: weight shift, gesture(s), direction, and rhythm. These criteria were chosen by the investigator and an expert dance instructor who had extensive background in dance ethnography. One point was credited for each correct criteria with a possible maximum total of 22 points in the Easy routine and 27 points in the Difficult routine. Each dance element (Appendix F & G) had a score ranging from 0 (no criteria correct) to 4 (all criteria correct).

I. Statistical Analyses Procedure

A series of one-way analysis of variance (ANOVA) was employed to compare the novice and advanced group on the variables of age and previous experiences in several

dance forms (jazz, ballet, tap, modern).

A doubly multiple analysis of variance (MANOVA) was employed on the performance accuracy scores due to that fact that there was a correlational structure *within* each group measure and a different correlational structure *across* the measure. That is, the scores of the novices were predicted to be correlated across the routines (easy and difficult), as were advanced dancers' scores. Additionally, there was some correlation expected between novice and advanced dancers in each of the routines. That is, participation in the first testing phase for the first routine would be expected to affect performance on the second routine due to similarities including but not restricted to: same model, same music, same choreographer, same procedure as well as the usual sources of within subject variability. Furthermore, the participants confirmed such influences as a result of the first routine:

> *I knew how to divide my time now and what to focus on. (Anita--advance)*
>
> *Hearing the music again helps, I picked up more notes. (Nadine--advance)*
>
> *By going through the process, I knew better time wise how much time I had. (Elaine--novice)*
>
> *I know how fast that 15 minutes would have gone. (Jenny--novice)*

A 2 x 2 (Group (novice-advanced) x Routine (easy-difficult)) within subjects MANOVA was performed to examine if any statistical differences existed on the dependent variable of challenge level (1-9).

In order to determine if any statistically significant changes occurred over time

with respect to the accuracy of performance, and whether Age was a confounding variable, a 2 x 2 (Group (novice-advanced) x Routine (easy-difficult)) within subjects MANOVA, with repeated measure on immediate (Time 1) and delayed (Time 2) recall, was performed on the five-level dependent variable of performance accuracy (weight shift, gestures, direction, and rhythm) adjusted for age (covariate). Regression analyses associated with age was performed to examine if age accounted for a significant portion of the variance on each of the performance accuracy criteria (weight shift, gestures, direction, and rhythm).

II. Qualitative Analyses Procedure

Making sense of all the comments reflects the principle behind hermeneutics. Gadamer talked about hermeneutics as the "process of interpretation, of translation" (Rorty, 1982, pg.3). This process of thinking or interpreting about the world could not be done without the injection of subjectivity. "A clear split between subjective thinking and objective thinking is ridiculous because my subjectivity gets its bearings from the very world that I take as my object" (Smith, 1991, pg.192).

In doing any interpretative inquiry, one needs to appreciate the arcs of the hermeneutic circle: the forward arc of projection, and the backward arc of uncovering (Packer and Addison, 1989, pg.275). Gadamer, freed the word prejudice or pre-judgement from the negative overtone stating that prejudgment "is a necessary requirement of all understanding. [It is] a sign that we can only make sense of the world from within a particular horizon which provides the starting point for our thoughts and

actions" (Smith, 1991, pg.193). It has been established that "any language, any framework for research or reflection, inevitably contains prejudices" (Rorty, 1982, pg.7).

Indeed, the lenses which the interpreter used to understand informants' interpretations of their own experiences would affect the kind of materials one would extract from the wealth of information. My "forward arc" of being a learner of dance has not only brought me to the current question, but it has also shaped my interpretations of the dancers' experiences. As interested as I am with the content of dance, I am fascinated by the process of learning. The more inquiries I made with fellow dancers and instructors as to how movements were learned, the more I realized that there is no one right way to learn. Each person has a unique way to combine strategies in their most efficient form. Numerous strategies may be domain-specific and, thus, shared by many, yet, how the strategies are interpreted, defined, manipulated, and used is entirely up to the individual. Therefore, this study which explored how novice and advanced dancers learn was conducted to better understand the learning strategies used by these dancers. By examining the novice and advanced dancers' experiences, it could "enrich our lives by the recognition that these possible experiences could be or become our own actual experiences." (Van Manen, in press).

The backward arc of uncovering and the first iteration of interpretation of each participant's interviews consisted of grouping similar responses from the participants together. This process was then repeated until themes emerged from these grouped responses. The information gathered from the advanced and novice dancers went through the iteration of interpretation separately and, therefore, was kept within the perspective of

each group. Following the full development of the themes within each group, comparisons were made between groups to establish the differences on themes and the content within a theme.

The wealth of information provided by the informants was overwhelming and included comments that spilled outside the scope of this study and into their regular dance classes and performances. For the purpose of focusing on the topic at hand, only the comments related to the current topic were drawn from the informants.

Results

I. Statistical Analyses

A Group (novice-advanced) x Routine (easy-difficult) MANOVA on challenge level (1-9) revealed two significant main effects. There was a main effect for Group and a main effect for Routine with no interaction. The Group main effect indicated that novice dancers rated the routines to be more challenging regardless of the difficulty level ($F(1, 15) = 16.18$, $p < .01$), with a mean challenge level of 4.88 for novice dancers on the easy routine, and a mean score of 5.11 for advanced dancers on the difficult routine (Table 2). The main effect for Routine ($F(1,15) = 22.94$, $p < 0.01$) demonstrated that the easy routine was rated lower than the difficult routine by both groups. The mean challenge level indicated by the participants were similar to those rated by instructors in Study 1 (Table 3).

Table 2

Means of novice and advanced dancers' rating of the overall challenge level (1-9) of each routine (easy and difficult).

Routine	Group	
	Novice	Advanced
Easy	4.88	3.16
Difficult	8.12	5.11

Table 3

Mean overall challenge level (1-9) of easy and difficult routines rated by instructors (Study 1), advanced dancers' rating on difficult routine, and novice dancers' rating on easy routine (Study 2)

Routine	Study 1	Study 2
Easy	5.33	4.88 (Novice's rating)
Difficult	6.33	5.11 (Advanced's rating)

A Group x Age analysis of variance showed a significant age difference between advanced and novice dancers ($F(1,4)=7.66$, $p< .05$). The novice dancers (mean age = 22.00 years) were older than the advanced dancers (mean age = 17.63 years). Subsequent analyses were therefore adjusted for age by using it as a covariate to reduce the confounding influence of this variable. Regression analyses associated with the analysis of covariance revealed that age did not account for a significant portion of the variance.

A Group (novice-advanced) x Routine (easy-difficult) x Performance Accuracy (weight shift, gestures, direction, and rhythm) x Time (immediate and delayed recall) MANOVA with repeated measures over Routine and Time adjusted for Age showed no significant effect of Age to performance accuracy. An interaction was found between Time and Routine ($F(4,11)=17.60$, $p<.05$). Further One-Way Analysis showed that the Easy routine was performed better on the immediate recall (Time 1) while the Difficult routine was performed better on the delayed recall (Time 2). A significant main effect of Routine ($F(4,11)=11.09$, $p<.05$) indicated that both groups performed better on the Easy routine. A significant main effect of Time ($F(4,11)=8.40$, $p<.05$) demonstrated that both groups performed better on the immediate recall (Time 1) than delayed recall (Time 2).

Follow up One-Way Analyses of Variance of Group (advanced-novice) x performance accuracy (weight shift, gestures, direction, and rhythm) suggested a significant difference between groups on the rhythm component of accuracy scores at both Time 1 ($F(1,14)=5.99$, $p<.05$) and Time 2 ($F(1,14)=5.78$, $p<.05$) on the difficult routine (Figure 1 and 2). The percent mean scores indicated that Advanced dancers had more rhythmic accuracy than novices when performing the difficult routine (Table 3 and 4). The actual mean and standard deviation scores are presented in Appendix N and O.

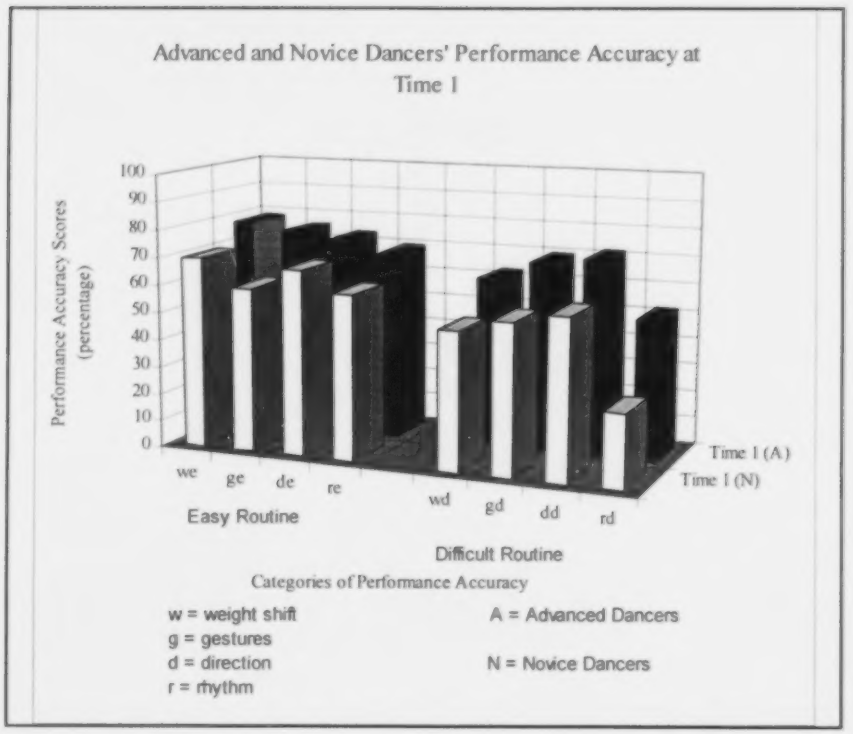

Figure 2. Performance accuracy scores (percentage) for each performance category in the Easy and Difficult routine for Advanced and Novice dancers at immediate recall (Time 1).

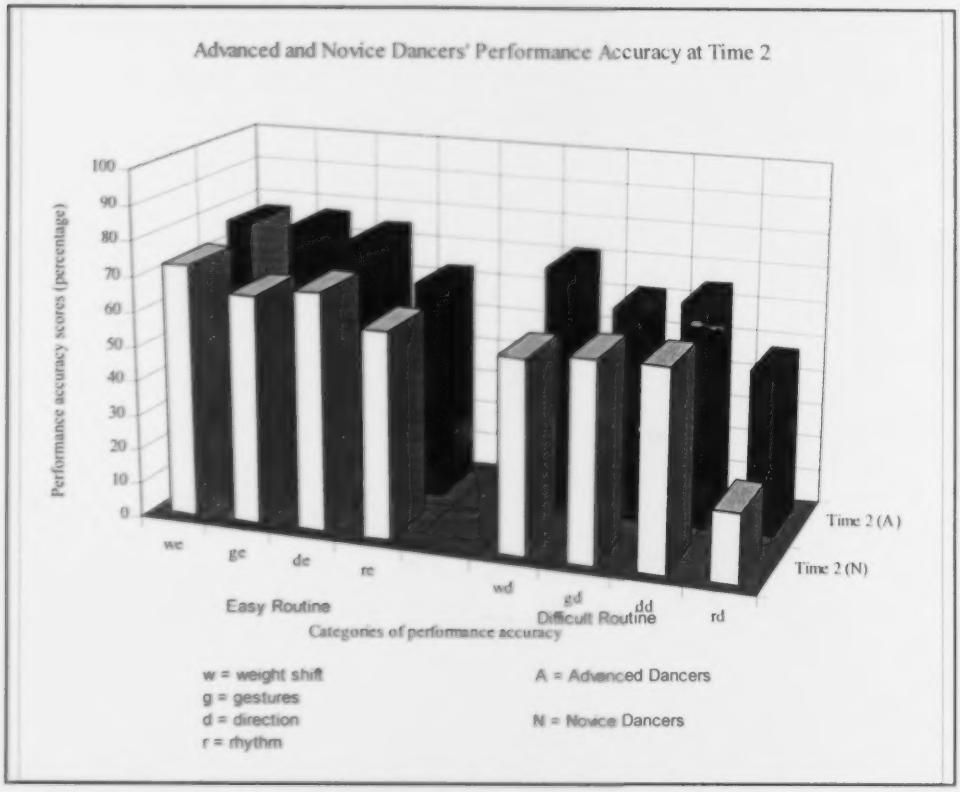

Figure 3. Performance accuracy scores (percentage) for each performance category in the Easy and Difficult routine for Advanced and Novice dancers at delayed recall (Time 2).

Table 4

Advanced dancers' percent mean scores and standard deviations on easy and difficult routine for immediate (Time 1) and delayed (Time 2) recall on performance accuracy criteria (weight shift, gestures, direction and rhythm).

Routine	Dependent Variable (Performance Accuracy)		Time 1 Percent M	Time 1 Percent SD	Time 2 Percent M	Time 2 Percent SD
Easy						
	Weight Shift	(we)	77.90	18.68	76.89	19.60
	Gestures	(ge)	75.25	20.49	76.64	18.99
	Direction	(de)	73.11	19.40	74.62	17.29
	Rhythm	(re)	68.94	29.06	63.13	25.76
Difficult						
	Weight Shift	(wd)	62.04	20.77	71.30	18.04
	Gestures	(gd)	68.93	22.47	61.21	16.82
	Direction	(dd)	71.30	22.71	64.71	19.28
	Rhythm	(rd)	51.03	20.71	47.33	23.04

Table 5

Novice dancers' percent mean scores and standard deviations on easy and difficult routine for immediate (Time 1) and delayed (Time 2) recall on performance accuracy criteria (weight shift, gestures, direction and rhythm).

Routine	Dependent Variable (Performance Accuracy)		Time 1 Percent M	Time 1 Percent SD	Time 2 Percent M	Time 2 Percent SD
Easy						
	Weight Shift	(we)	69.60	35.07	72.87	29.83
	Gestures	(ge)	59.66	30.64	64.91	24.97
	Direction	(de)	67.33	31.44	68.47	28.99
	Rhythm	(re)	59.94	34.62	59.66	30.49
Difficult						
	Weight Shift	(wd)	50.13	22.89	55.95	22.09
	Gestures	(gd)	54.37	23.00	57.80	22.03
	Direction	(dd)	57.54	24.39	57.54	24.00
	Rhythm	(rd)	26.72	18.27	20.11	21.69

A Group x Routine between-subject MANOVA on the order of presentation (easy first or difficult first) and time of recall within a routine(immediate and delayed recall) showed no significant order effect on whether easy or difficult was presented first; no significant difference in performance accuracy was found between the immediate and delayed recall for either routine. This indicates that there was no memory decay between the first and second recall of each routine over the interview time. The interviews between the first and second recall were on average, 22.45 and 29.14 minutes

respectively for novice, and 24.44 and 24.67 minutes for the advanced dancers.

A Group (advanced-novice) x Dance Experience (jazz, ballet, modern, tap) MANOVA demonstrated no significant difference between advanced and novice dancers on number of years spent with each dance form (Table 1). Novice dancers had, on the average, 7.88 years in Jazz, 6.25 years in Ballet, 4.00 years in Tap, 2.5 years in Modern. The advanced dancers had a mean of 9.25 in Jazz, 10.25 years in Ballet, 4.00 years in Tap, and 2.25 years in Modern.

II. Qualitative Analyses

It is not meaningful to present the qualitative data without the inclusion of interpretations. Thus, these interpretations were a vital part of the presentation of qualitative results. The focus of the present study was to understand the strategies used during the process of learning and remembering by both novice and advanced dancers. As such, the cognitive strategies discovered were organized with respect to how the dancers encoded and retained the presented dance routines. Encoding is defined as "the process of selecting stimulus information and representing it in a form that can be stored in memory" (Shea, Shebilske, & Worchel, 1993, p.58).

Although initial examination of the kinds of strategies selected by both groups appeared to be similar, further analysis revealed that *how* these strategies were used, and the personal definitions of these constructed strategies, were vastly different. These strategies influenced how well the movements and the dance routines were retained. The strategies used to retain the presented dance routines were also similar in nature, but the

distinguishable feature between the two groups was the extent to which and how these strategies were used.

The difference in how information was encoded between novice and advanced groups was consistent with the chess training study by Ericcson & Harris in 1990. Even after success in the extensive training of novice chess players to match the performance of chess masters, non-experts were not able to attain the expert's elaborate representation of the information. Trained non-experts encoded salient periphery patterns of the chessboard while experts encoded central aspects which were critical in the selection of subsequent moves. Therefore, similar to the findings of this study, non-experts encoded the domain-specific information differently than experts (Ericsson & Charness, 1994).

In addition to the encoding and retention processes, a noticeable difference between the two groups was the advanced dancers' ability to combine several strategies together which were used simultaneously in a dance specific "package". Thus, not one strategy alone contributed to the overall learning and remembering process. Therefore, when advanced dancers spoke of a certain strategy used, it was usually coupled with other factors which made their overall "package" much more effective in their encoding and retention processes.

In the current study, the strategy that was most widely used by all dancers to facilitate remembering the dance routines was counting. Rhythm is the backbone of most dance forms and provides information on the number of beats and counts. Movements in the jazz routines were developed with the music, therefore, specific movements were linked to particular counts of the music as it progressed. For most of the advanced

dancers, counting in phrases of eight was "automatic" and "unconscious". Whereas novice dancers needed to count to be on time with the music, advanced dancers became more aware of those counts only if they found themselves off time. As a result, advanced dancers seemed to have a better "sense" of rhythmic information than novices.

If I know that I'm off, then I'd think about the counts again, and know where I'm suppose to be (Ann--advanced, difficult routine).

Every once in a while, I would count in my head. It would just come out of nowhere. Especially if I'm getting behind or ahead of the music, your mind will kick in and start counting. (Sharon--advanced, easy routine).

In addition to the difference in rhythmic awareness, counting was also used differently by novice and advanced dancers. Novices applied strict definitions with limited usage of counting. They selectively attended only to rhythmic information through the underlying beat and disregarded the different types of instruments used, the high and low notes in the music and the syncopation on top of the underlying rhythm. Furthermore, novices would not match movements with counts, and tended to memorize the movements from the beginning of the routine sequentially, independent of the counts. For example, when asked how counting was used, one novice responded that counts were effective in providing for rhythmic information only, and she could not identify movements in conjunction with counts:

I just count to make sure that I stay on time...when I am doing it, I think out all of the counts just so I know what is going on, but no, people have asked me to do, say, from the third set of 8, Uh...sorry, I can't do that...don't remember that part. (Carmen--novice, easy routine).

I was counting how many times her head went to the right in the beginning. That would tell me how many sequences she went through of that. In the middle of it how many chasse she did or whatever you call them. (Eileen--novice, easy

routine).

The music had a really good beat to it, I concentrated on the rhythm. (Rachelle--novice, easy routine).

I think the most prominent thing in the music was the drum beat, that's what I heard the most. I had the drum beat in my head and that's what helped me run through all of the counts. (Carmen--novice, difficult routine).

Moreover, the usefulness of music for a novice is not only narrow, but it could also be seen as a disturbance to the whole learning process. This suggested that novices did not have the capacity to attend to many aspects of the stimulus at once.

I could have got it better without the music. I wouldn't have been as fast, speeding it up kind of threw me off a little bit. I tried not to think of the music while I was dancing. Even though it drove me nuts because I was off time, but I tried to just do it without paying attention to the music as much...I like to do it without the music, till I get it set in stone in my head. (Jenny--novice, difficult routine).

I turned down the music so I can focus more just on the movements. (Theresa--novice, difficult routine).

I found it (the music) annoying after a while. I didn't like it. It was too repetitive. The start was a bit different, the music changed in the beginning, the rest is just the same. I could count it out. That's why if you turned the tape on at any point, I wouldn't know it (Marie--novice, difficult routine).

It was easier not to play the music and just count it out. (Carmen--novice, easy routine).

You want to slow it down, the music doesn't help. (Diane--novice, easy routine).

Once you know the movements then you can use the music, but you don't need to use it to learn it. It doesn't help. (Eileen--novice, difficult routine).

Herein lies a significant difference between advanced and novice dancers. Specifically, the depth and the kind of information provided by the same piece of music was perceived

quite differently. The abundance of cues provided by the music was critical in its function as part of an effective strategy package for the experts. The advanced dancers have a dual encoding process, which allowed them to encode certain movements with a vast number of musical cues, such as the high and low notes of the music, specific instrumentational highlights of the music, and rhythmic information. Advanced dancers were not only able to selectively attend to many different and significant stimuli, they were also able to combine and encode them in such a way that would ease the retention process.

I remember certain movements with different parts of the music, where it goes higher or lower, it tells me when to turn or jump. (Elizabeth--advance, easy routine).

After the Russian jump and she goes up, there's a little thing or something in the music... I went not so much with counts, but I went with the music, and the "do-do" , which would be the chaine, it just fit. Even in the beginning, there's that little music starts, there's when you do the arm thing...when she was doing her head and snaps, and when she was on the floor and looks up, there's a snapping in the music. (Karen--advance, difficult routine).

You can feel it, there's certain rhythm in the music, you just have to find it. It's not just beat. The music changes, any music I can tell you, even in the middle of the music, just something that you learned to do...there's a strong point in the music with certain movements and I'd remember what I had to do at that point of the music (Anita--advance, easy routine).

I learn it by the music, I learn which should go where by the count. Like that sound there, she should have that movement. Or at the beginning, I knew when to start because the "de-de-de-de" (humming the music) started, and I knew that I had to be at the end by the "erring!" Certain melody and music, not necessary the base, which is basically the same. (Nadine--advance, difficult routine).

I really use the music to match the choreography. The highs and lows. It's got that jazzy trumpet undertone. That's how I ended up pulling off whatever it looked like. I think more than half the dance is getting the feel of the music or the attitude of it, so you tried to get that too...like "de-de-da, de-de-da" (humming the

beginning tune) I actually say that in my head to keep the music in my head....Silence could be considered music, musicality is so much part of dance. (Sharon--advance, difficult routine).

Usually the music tells you what to do, with this one you can tell when you're supposed to move your head, at least I can. (Tammy--advance, easy routine).

There're these drums, you know you're suppose to start when they start. (Linda--advance, easy routine).

The trumpet stuff helped a bit, I think I know when to hit the jump because you remember parts of the music. It's like a cue. (Dorine--advance, difficult routine).

The positive influence of music cues on recall have been demonstrated by the expert ballet dancers in the second experiment of Starkes et al. (1987). Experts from the National Ballet School were able to use musical cues to enhance recall of eight serial positions with a notable difference in the last position between the music and no music condition. Similarly, the advanced group of the present study attested not only to the value of music but also to how it was used to enhance their learning and remembering of the dance routines.

Just as the novices in this study showed that they did not consider music a worthwhile strategy, neither did the participants in the study of the Gray et al. (1991) study. None of the 34 participants in that study had any prior nor recent dance training. The study found no significant difference in performance accuracy between the "kinematic (video) only" or "kinematic with music" conditions. This suggested that novices do not use the musical cues provided as a strategy to enhance their performance.

A part of the advanced dancer's "package" of strategies was the use of labels. The novices only encoded the verbal labels to represent certain movements or movement

patterns. Conversely, advanced dancers combined and simultaneously used the labels with counts, music, noise representing the quality of performance, and even created their own song.

In my head, I would use the words and counts together like 'push-turn' as '1-2'. (Anita--advance, easy routine).

I'd say the words and the counts like 'hold 2, 3,4'. I would say it with the counts like 'chain-e' as '1-2'. That's just from habit, 'walk-walk, chaine chaine' would be like ' 1-2, 3 and 4 and' ...I would say the accent movement, say a jump, louder. (Dorine--advance, difficult routine).

I wouldn't use the name sometimes, I'd use 'big jump' so I can get the momentum to do it. The grand jete in the back corner too, it's 'ok, plie!' Or 'power' for the turn, then she came around and wacked it, so I just went 'pew!', 'smack!'. (Karen--advance, difficult routine).

Instead of going '1 and 2', I would go 'pas-de-bourre'. I'll just say the words in my head. May be not necessarily the words, like I'd go with the music 'de-de-de-de', as 'pas-de-bou-rre' (she was singing 'pas de bourre' with the music). I would fit it so that I would make the words sound like it's in the song and make the music sound like the words. (Nadine--advance, easy routine).

The contrast of the advanced and novice dancers rests, with respect to labels, not in their use, but on how and what labels were used. For example, the mental space it took for a novice to encode "do a turn, stand up really tall" (Marie) may simply be a "chaine" to an advanced dancer. A "step together step pause" (Rachelle) for a novice may just be a "chasse" for advanced dancers. By labeling a chunk of information, advanced dancers reduced the memory space taken up by the same amount of information compared to novices, who had to encode each bit of information separately.

Such distinction of chunking between the two groups was present within the verbal recall of the routines. Advanced dancers used mostly dance specific terms to

describe the movements while the novices did not. The analysis of verbal/motor recall of the routine showed no difference between actual physical performance and verbal description of the routines for either groups.

Novices acknowledged that while they knew the routine mentally, they could not perform it physically. The use of verbal label codes to represent the movements resulted in the necessary transfer of information into motor codes which increased the amount of time and capacity needed to encode the movements:

I need to know confidently before I can do it. I can do it in my mind, theoretically, but I couldn't do it. I try to know it first in my mind. (Marie--novice, difficult routine).
I tried to do it all in my head first. I do it more in my mind, like the first one. (Marie--novice, easy routine).

Right now, it's very up here in the mind. You have to say the words, which makes your body do it. (Diane--novice, difficult routine).

It's like your mind knows them but your feet are not following. (Theresa--novice, easy routine).
I know it more in the mind than in the body or to be able to do the movements. (Theresa--novice, difficult routine).

The rationale presented by the advanced dancers in the efficiency of coding the feeling of movements was in the concept of "muscle memory". This is a dance-specific idea that the muscle has memory, and the more one physically practices the movements, the more the muscles or the body remembers:

The more you do it the more you remember what you are doing. The parts that I remember, I can just do it and think about something else. So my body sort of knows what to do. (Elizabeth--advanced, difficult routine).

So during learning, I would see how my body felt doing certain things. Doing it full out helps you remember. (Karen--advanced, difficult routine).

Once you learn it once, I don't forget. I just have to remember how it feels doing the movements. You have to be really conscious of every part of your body. (Ann--advanced, easy routine).

It's sort of like master pianist, and they don't have music in front of them, I play the flute, my finger would just know how it feels at a certain point of the music. Sometimes, my mind isn't even thinking about doing the dance, I just listen to the music and I'd just do it. When I had to do it by myself, I don't let my mind think about it. I would just let my body do it. (Nadine--advanced, easy routine).
I just did the routine, didn't think about what came next, I just let my body do whatever. (Nadine--advanced, difficult routine).

It goes into your muscle memory. Your body just knows how to do things, that's when you put the attitude. (Sharon--advanced, easy routine).
There's that muscle memory but you still need to have that balance of having it in the mind. You've got so many layers, you are conscious of what you look like, you are saying the moves, doing the moves, trying to have the attitude, sometimes smile and try to look nice. (Sharon--advanced, difficult routine).

My muscle memory remembers the dance, so basically I just have to remember the counts, the body does the rest. The more you do it, the more your reflexes know how to do it. (Tammy--advanced, difficult routine).
I tried to do things the [wrong] way and if it feels awkward, then I tried a comfortable way to do it. (Tammy--advanced, easy routine).

Advanced dancers obtained more information for any one particular phrase of the routine by combining counts, musical cues, and verbal labels to make an gestalt package. By encoding this unique "package" of information, the advanced dancers increased the meaningfulness and enhanced retention of the information presented. The increased sources of information for each movement would then increase the richness of represented information.

In addition to the use of verbal labels by advanced dancers, both groups used chunking as a strategy to retain the dance routines. Subjective organization, where movements are organized in a meaningful manner by an individual, can be described in

other terms such as "chunking, clustering, categorizing, unitizing, and grouping" (Magill, 1989, p.269). While both groups chunked their movements, each group performed this process differently. First, advanced dancers had fewer but bigger chunks of movements while novices had many smaller chunks. All advanced dancers broke the routines into two to four sections with a majority of dancers preferring three sections; but the novices used four to nine sections. This seems to be in line with the characteristics of a beginner. "The beginner tends to consider complex motor skills as comprised of many parts" (Magill, 1989, p. 270).

Second, the advanced dancers chunked the routines in a dance specific manner. Those dancers who had three sections not only had the exact same partition, but it also appeared to be directionally and musically phrase driven. A section usually started at the beginning of a musical phrase along with a major directional change in the routine. For example, in the difficult routine the second section began at the start of the diagonal sequences. On the other hand, novices had a more random way to distinguish their sections. The majority of the parts fell within a phrase, and were organized in a step-by-step or movement-by-movement fashion regardless of the dance environment: "I usually learn till I get lost. I don't necessarily count it" (Eileen--novice, difficult routine).

This is consistent with the pattern-recognition paradigm (Chase & Simon, 1973), which demonstrates the experts' advantage with structured and familiar information as opposed to random ones. Starkes' et al. (1987) ballet study showed the dance-specific nature of the expert's advantage in a sequence that was organized as a ballet routine as oppose to a randomly structured routine. Similarly, the advanced dancers in the present

study were able to organize the dance routines in a dance-specific manner. Instead of having more memory capacity, the advanced dancers simply chunked the routines so they did not have to recall every item presented separately.

Third, advanced dancers learned these chunks separately. Some dancers did not even learn them in the order of the routine: "I learned the third part first" (Karen) or "I learned the middle part last" (Ann). However, each segment was learned in order, by most novices, as one long sequence. As novice dancers "added-on" from the beginning and made the routine longer and longer, they also had to go back and rehearse the routine from the beginning every time they "added-on". This created an elevated number of rehearsals of the early items compared to the later ones:

I spent so much time in the beginning to learn the arms, so the middle and end part I kind of rushed through. (Carmen--novice, difficult routine).

I was going through by 8s and I didn't go through the end part as much. (Elaine--novice, easy routine).

I've got the beginning pretty well, but that's it. (Diane--novice, easy routine).

I stopped it in the very beginning. I spent the most time in the very beginning I think. (Jenny--novice, difficult routine).

I spent the most time in the beginning, middle too. I haven't learned the ending part, I've seen it. I would learn it in order. (Theresa--novice, difficult routine).

One dance specific strategy inherent in the dance routines, which aided the identification of possible meaningful chunks for both groups, was the idea of "highlight" movements as opposed to choreography. Familiar or technical movements, such as certain turns and jumps to which both groups had been exposed in dance classes, were

considered as "highlights" and could be easily identifiable. On the other hand, non-technical movements, styles, or attitude of the dancer in the routines, such as complex arm or foot movements that were new and unfamiliar to them were considered as "choreography":

Anything big, like jumps, I'll always be there, but the little things like the arm thing...It's not the steps, just choreography that I was trying to get down. (Ann-advanced, difficult routine).

That's what we do in jazz, we do triple pirouettes and double turns, the other choreography stuff I wasn't so sure what she was doing. If you think about it, a chaine turn is so much easier than if she strikes a pose. You have to account for both arms, where they are, which way they are facing. Are they bent? Are they straight? Are they forward? Are they back? So one pose is so much harder to do than just a turn. (Nadine-advanced, difficult routine).

It was mostly movements that I knew, but new choreography, the little things. The funky thing, I almost had it, it's like muscle memory, once you've got them, you've got them, but it would take me more than 15 minutes. (Sharon-advanced, easy routine).

Certain things go together, like push turn out of the pirouette. After the chaine axel and grand jete, it feels right to go into a jump from an axel. I've done those things in class. The arm movements are the hardest, more complicated, I've never put them like that before. The transitions, between the jumps like some steps are also hard. (Linda-advanced, easy routine).

Like the 2 chaines, a double priouette and hold, that would be the major parts for me. A lot of the arms I'm not sure of. It's the little steps that I'm not sure of. A jump is a jump, but when someone is making up new arms it's hard for you to grasp at first. I only had to watch the diagonal sequences couple of times (difficult routine--all sequences of turns and jumps). Like if it's a step or chasse, I would just talk myself through the movements. With the arm thing "hit hit, bend the down" , it's just a bunch of clues so I can remember. (Dorine-advanced, difficult routine).

I've done a lot of the movements before, it felt natural for me to do a chaine and go into a pirouette right after, I could learn it in a couple of seconds. But when I had to do something complicated like the arm thing, I get confused. (Rachelle--novice, difficult routine).

The feeling of the turns and leaps are imbedded in my brain, I've done them so often before. It was those abstract things like the connecting steps, you have to watch very carefully to see where the hips are going where the feet and arms are going, so it was quite difficult. (Carmen--novice, difficult routine).

I just had to watch the jumps and turns a couple of times, then I knew. The little connecting movements were tough. The choreography in the beginning, those quick arm movements were hard (Elaine--novice, difficult routine).

Those connecting steps in between gave me the most trouble, those lead you to the right or the wrong foot to do the turns (Diane--novice, easy routine).

The parts that were easier to remember were what I was familiar with, like a turn. I can't do a triple turn, but I can do a turn, so that was familiar to me. When she was not doing structured technique, I sort of blanked out on that, like the kicks. (Marie--novice, difficult routine).

Not the elements like the axel, I've done that, although rusty. Just all the arm movements, that's different, I've never done anything like that before. (Jenny--novice, difficult routine).
Each step that she did here, not that it was new, but the way it was choreographed, it was different. (Jenny--novice, easy routine).

The participants expressed that the elements, even the difficult techniques for novices, were familiar to them. The learning had much more to do with how these elements were put together and how the process related to unfamiliar choreography.

The strategy the advanced group used most efficiently to retain and rehearse the movements, without having to physically perform them full out, was simply the use of "hand or foot movements as cues", referred to as "marking" (Starkes et al., 1987, p. 227). While "marking" was not a common practice among the novices, the use of this strategy was used regularly by the advanced dancers. The advanced dancers spoke of marking as a critical part of energy efficient rehearsals:

Until I turned off the video I was just marking, I started to do it a little more full

out after. Dancers don't want to waste all of our energy on little things. Steps that I know what to do, I was just marking it, like the leg extension, I was just marking it. I think I did it once just before I performed it. (Tammy--advanced, difficult routine).

Whenever I'm doing it in my head, my feet are always moving, but I'm not doing it full out. I'm thinking about moving, I just do a little arm thing instead. I'm only doing half of what I should and half the energy so I can think of the movements and remember it. (Ann--advanced, easy routine).

I do it full out a couple of times just to get it through my head, but after that I just marked it, my arms just mark it out. (Sharon--advanced, easy routine).

I was marking them, saved my energy. (Karen--advanced, difficult routine).
I was marking [the routine] for a while. (Karen--advanced, easy routine).

I went through the whole thing just marking it. (Linda--advanced, easy routine).

One powerful rehearsal strategy employed by both groups was the use of mental imagery. The majority of novice dancers had images of the model performing certain movements, whereas the advanced group visualized the model and "saw" themselves performing the routines. The latter is consistent with the "external imagery" established by Mahoney and Avener in 1977 (as cited in Magill, 1989)which stated that the individual would have the images from an observer's perspective, as if watching a movie of himself or herself.

In my visualization, I would see her dancing on the camera and I would be trying to copy it. So I visualize exactly what I saw on the TV. I was looking at the camera as if I was looking at the video. (Elaine--novice, easy routine).

Just visualize how she did it and which way she went (Eileen--novice, difficult routine).

I can visualize and track it in my mind what she is doing. Just the sequence of her movements, I knew she went forward, back corner...(Marie, who did not perform this (difficult) routine--novice).

I think I would watch her in my head once the tape was turned off. Then I tried to watch what she's doing, like a mental image of her. (Jenny--novice, difficult routine).
I think I was trying to follow her in my head, trying to follow her arms (Jenny--novice, easy routine).

When I physically couldn't remember what to do, I would try to picture it, but not when I'm dancing. Just choreography, I don't see jumps, those are not stylized. (Theresa--novice, easy routine).

I could 'see' her doing the routine, like when she lifted her leg up. It's just something that I automatically do to try and remember it. (Elizabeth--advanced, difficult routine).

I would especially visualize the arms, I watched it so many time, I can still see her. (Karen--advanced, difficult routine).

I was trying to remember, trying to picture it in my mind what I saw on the screen. (Ann--advanced, difficult routine).

I had that third person looking at myself, you have a sense of what you look like as you are doing it. (Sharon--advanced, difficult routine).

I visualize myself doing the steps. It's like looking at myself. I watched myself. (Linda--advanced, difficult routine).

I think I see myself wearing this exact outfit. I know that's me, I can see myself turning or doing the steps. I don't see her. Say the triple pirouette, I see myself doing it oh so perfectly. (Dorine--advanced, difficult routine).

The advanced dancers had more descriptive details of the images and exactly where in the routine they pictured the model or themselves. Some advanced dancers went beyond visualizing the model or themselves to literally becoming the model herself:

I wouldn't have an image of looking at her on the TV. I would have an image of looking down and I was her. She was wearing a black half top, black tights, and she has blonde hair and beige jazz shoes, so when I look down, I see beige jazz shoes, a half top and I can see blonde hair swinging from side to side. It was everything. I pretended that I was wearing that and I pretended that I could see my blonde hair. (Nadine--advanced, difficult routine).

The consolidation period of 3 minutes free time immediately after the learning phase provided both groups the opportunity to retain the dance routines. The way participants encoded the dance routines directly influenced how the routines were retained. For instance, the advanced dancers used musical cues as a strategy to encode the routines and also used music during the consolidation period to enhance the retention of the routine by either playing the audio-taped music or playing the music in their minds:

I put the music on and tried to go through it, then I tried to feel it for myself. (Nadine--advanced, easy routine).
I just used the music and did the routine, just let my body do it (Nadine--advanced, difficult routine).

I had the music in my head and just went through the routine with counts, just did it over and over 4-5 times. I would also be going over the jumps just marking them. (Tammy--advanced, difficult routine).

I put the routine to music and did everything full out all the way through a few times. I turned the music off and just walked or marked through it twice. Then I went with the music again. I felt I knew it pretty well. (Linda--advanced, difficult routine).
Same as last time, I went through it with the music, then I did it twice without and once again with the music. (Linda--advanced, easy routine).

Just running a mental map in my head. Just doing it physically and mentally. (Dorine--advanced, difficult routine).

I had the music in my head (started humming). I get songs stuck in my head very easily. (Tammy--advanced, difficult routine).

I had the whole music, it would be going on in my head, and the movements go with the music, and I'll put that in. (Karen--advanced, difficult routine).

Conversely, novices did not employ musical cues as an effective strategy and found it disturbing during the learning phase. They also did not utilize the availability of music

during the 3-minute consolidation period:

No I didn't use the music, I knew the counts so I can just do that. (Carmen--novice, easy routine).

No, I didn't use the music or have music in my mind. I couldn't because I didn't know it well enough. The music would just be a waste, and I had to stop and think which way the turn is, which foot leads, and what comes next. (Elaine--novice, easy routine).
I was trying to piece together from the beginning as much as I could. (Elaine--novice, difficult routine).

I wanted to know the sequence of the dance in my head before I added the music. Because I figured that if I didn't have it then the music would throw me off. (Jenny--novice, difficult routine).

To the extent which the encoding processes influenced retention, one may consider the consequences of encoding the wrong information:

I try to remember the same way as I learned it. If I learned it wrong, then I would remember it wrong. I sensed that it's wrong, but I can't stop, it's gone already. (Theresa--novice, difficult routine).

Davenport's (1983) study suggested five general types of dance learning strategies: visual, aural, kinesthetic, expressive and cognitive. Although the study was based on live instruction in modern dance, which has its own domain-specific strategies, the strategies discovered in the present study could fit into these categories as defined by the author (Table 6).

Table 6

Learning strategies for modern dancers as defined by Davenport (1993, p.69).

Categories	Learning strategies
Visual	Imitating movement; using the mirror to self-correct; seeing illustrations or reading written material
Aural	Listening to instructions, corrections, counts, cues, breath, rhythm, and musical accompaniment
Kinesthetic	"Sensing" the movement and one's internal body patterns; creating a smooth transition from one step to another; attending to dynamic changes; monitoring inhalation and exhalation; readjusting after a teacher (or other) has used physical touch to correct
Expressive	Identifying with and reacting to an emotional, visceral, or somatic sensation during the movement sequence; dancing for communicative purposes; relating to other students; being imaginative; responding to situational circumstance
Cognitive	Grasping the sequence of the movement pattern; knowing the location of specific muscles or structure of aesthetic elements; incorporating technical corrections inside of new movement; identifying personal verbal cues; memorizing the pattern to perform fluently; applying the imagery presented by the teacher

The participants certainly used visual information from the video as a source for imitation. "I tried to mimic what she is doing to the best of my ability" (Tammy--advanced). " She was doing it faster than I could, so I was usually copying one step behind her" (Carmen--novice). Even though mirrors were not available to the participants, none of them thought that they would have had the opportunity to use it due

to the limited time allocated for this study. Mirrors would have mainly been used as a self-checking tool.

> *I don't use it (the mirrors) to remember or learn, just to check and see if I'm doing things right. (Linda--advanced, easy routine).*
>
> *Just to see if you are holding your arms out at the wrong angle or little technical things. It helps with posture and to see if you are kicking at the same level as other girls if you are in a group. (Dorine--advanced, difficult routine).*
>
> *I would use it only to see if I'm doing the movements correctly, like extensions and stuff, not to learn movements. I just need to add on from the beginning. (Eileen--novice, easy routine).*
>
> *I don't think I would have used it while I was learning even if you have mirrors here. Maybe in the free time, I might have used it to compare with the pictures I have in my mind about how it's supposed to look like. (Diane--novice, difficult routine).*

The use of aural type strategies, such as counts, rhythm, and musical accompaniment were certainly included as those used by all of the participants, even if they were used differently by both novice and advanced groups. The kinesthetic, expressive, and cognitive types of strategies are those that could be personalized by each individual dancer as expressed by the participants in the present study. Yet some visual and aural types of strategies could very much be context driven.

The analysis of participants' responses to the testing environment and the stimuli used revealed that one of the most concerning factors for the participants was the lack of instruction, not being able to have a 3-dimensional image of the model, and not being able to ask the model questions. This is a case where ecological validity yields to

experimental control. Strategies used by the learner could not be isolated from those used to instruct the dance routines if a live instructor was employed as opposed to video-taped performances. Therefore, the self-generated learning strategies would be lost. All of the novices and some advanced dancers had difficulty learning from a video, especially one that showed only the frontal view. Most dancers have been used to learning from behind the instructor, facing the same direction so they could simply copy his/her movements. The instructor's frontal view would also be provided in a dance studio with mirrors. Therefore, some context specific strategies were adopted by the participants. For example, some participants would stand in front of the television facing the same direction as the model and watch the video by turning their heads around in order to match their usual learning environment. Using the same strategy, a novice (Diane) moved the video-television unit to the middle of the room so she could map her direction. Very rarely would slow motion be used by the participants as music and rhythm would be lost during the use of that function.

> *The slow motion is not like slowing it down when someone is teaching you. They would do what's on a count and what's on a half-count, they would move from position to position. The slow motion on the video doesn't do that. (Diane--novice, easy routine).*

Similar to the encoding and retention processes prevalent in the motor learning literature is the attention and retention process found as part of observational learning in Bandura's Social Cognitive Theory (1986). The premise of the present study rested on the participants' ability to observe and learn the dance routines from a model. The bridge between the theoretical frameworks of Bandura's Social Cognitive Theory (1986) and

cognitive psychology on which much of motor learning research was based, was the views that a person is an active learner. In the attentional process of observational learning, one could attend to certain stimuli while ignoring the others. The process involved the subjective construction of the modeled activities in a meaningful manner. The advanced dancers in the present study attended to musical cues and created elaborate meaningful strategies associated with music. The novice dancers chose to ignore musical cues as part of their strategies.

Once the model was no longer present, Social Cognitive Theory (1986) states that the information would be transformed into memory as a symbolic form. As a result of repeated exposure to the images of the model performing the dance routines, all participants in this study had imaginal representations of the movements. The merit in transforming information into visual imagery is most noticeable in situations that "include intricate actions conveying information about spatial and temporal coordinations that is more subtle than the words available to describe them" (Bandura, 1986, p. 58).

The use of verbal codes, rehearsal, cognitive organization, and cognitive rehearsal also plays an equally large role in observational learning, which is represented in the findings of the present study. Interestingly, Social Cognitive Theory stated that those observers who employ "dual coding scheme", which combined verbal codes with meaningful and familiar cognitive structures, retain more information. Similarly, those who combined cognitive or mental rehearsal with physical rehearsal benefited by retaining more information. This concept of combining encoding and rehearsal processes was comparable to the idea that only the advanced dancers possessed a "package" of

strategies which enhanced their learning and remembering of dance routines.

Discussion

This study was designed to consider the learning strategy of experts and novice jazz dancers through two methods: qualitative and quantitative analyses. In this case, therefore, the qualitative method and thus the data can be used to gain greater insight into the quantitative results than simply experimenter-driven interpretation. The participants themselves had explained some of the results found in the quantitative analyses. Therefore, the present discussion combined participants' own responses, as established previously in the qualitative analyses, and in the discussion of the quantitative results.

Quantitative analysis of the participants' subjective rating of the overall challenge level of the dance routines clearly supported the notion that the easy routine was more appropriate for novices while the difficult one was more suitable for advanced dancers. This supported the hypothesis that participants' rating of the overall challenge level should reflect the appropriateness of the routines by rating their respective routine as neither too easy or too challenging on a scale of 1-9. In addition, the overall challenge level rated in Study 2 was comparable to those rated by instructors in Study 1 (Table 3). Hence, the overall challenge level of the dance routines was validated from both the instructors and participants' perspectives.

Quantitative results of the participants' performance accuracy also supported the hypothesis that advanced dancers performed better on the difficult routine and novice dancers performed better on the easy routine. These results further supported the notion

that selected routines were appropriate for each group. However, quantitative analysis indicated that both groups performed similarly on the easy routine which was not consistent with the rating of that by advanced dancers (3.16 out of 9). Moreover, the results did not support the hypothesis that advanced dancers would also perform better on the easy routine given their expertise. Even though the advanced dancers found the easy routine to be unchallenging, they performed only just as well, not better, than novices who found the easy routine to be more challenging. One explanation came from the qualitative data which suggested that strategies, such as counting, chunking, highlighting/choreography, and identifing, typically used by advanced dancers during the difficult routine were, in fact, not used when the easy routine was presented. Furthermore, the use of elaborate images, or "package" strategies found in the difficult routine, were not mentioned in the easy routine:

Because it wasn't that hard to remember, I didn't have to count out the 1s. There wasn't much faster or slower things, it was pretty much the same speed. (Linda--advance, easy).

I didn't have to break up this routine. There aren't any highlights, everything is at the same level, no jumps and stuff. (Linda--advance, easy).

No word cues like "big jump" or whatever I used in the last routine. This was just one level. The chasse was all one level. It was easy. (Karen--advance, easy).

This was basically a dance for beginners, there was a big difference from the first one. It was just easy, just walks and chasse. I just wasn't paying attention to the arm stuff. I would just learn the first step to get the beat, I'd learn the next step. I wouldn't divide it up, I'd do the first then add on and make it longer and longer. (Anita--advance, easy).

In addition, some advanced dancers even found the difficult routine easier to learn. Even though the movements in the easy routine were not challenging for the advanced dancers,

they found the movements to be those that they had been exposed to long ago when they were still novices. Such movements were no longer part of their current dance repertoire. Moreover, advanced dancers generally found less challenging routines to be less interesting to learn, which could also explain why they paid less attention to the easy routine:

For some reason I thought [the difficult routine] was easier to do. I don't know why. It was easier to learn. I was just looking at the basic movements, like the triple pirouette, leg extension. I wasn't paying attention if it was the right way or not. I was more confident in this one. (Nadine--advance, difficult routine).

I like [the difficult] one a lot. It was really good. I really got into this one. It was easier to get into that mode. This was a harder routine but it was easier to learn. (Sharon--advance, difficult routine).

[The difficult routine] made more sense to me, I found the direction of this one easier, it just seems logical to go there. The first one was too slow. (Elizabeth--advance, difficult routine).

Because it was easier in a certain way, I didn't feel like I was doing as much, or to have to remember as much, or feel as much pressure. There wasn't anything...with this one, you are just kind of going, there's no real climax, it's pretty monotone. You are doing similar things to learn but not as much. (Dorine--advanced, easy routine).

On the other hand, the movements in the easy routine were precisely those being introduced and practiced by the novices at the time of this study which explained the comparable performance accuracy by the two groups in the easy routine.

Another explanation for the similar performance accuracy between the two groups in the easy routine was due to the scoring system employed. Both groups were evaluated quantitatively under four categories (weight shift, gestures, direction, and rhythm). While these measurements are appropriate for recording the factors which influence the accuracy of the performance, qualitative and aesthetic factors such as quality of

performance, flow of the movements, attitude of the dancers, and degree of technical presentation (eg. full extension of the arms, fully stretched feet, body alignment...etc.) are all important aspects which make dance a performing art. Both groups demonstrated similar performance only when these accuracy categories were used. It may not provide a true reflection of "equal" performance level. A more accurate performance assessment may have been the case if the full spectrum of qualities that exist in dance performance were included. While the purpose of this study did not include subjective commentary on the quality of the participants' performance level, it should be noted that the advanced dancers were more concerned with performance and demonstrated qualities not found in novices.

Quantitative analysis of performance accuracy components (weight shift, gesture, direction, and rhythm) indicated that advanced dancers had more rhythmic accuracy than novices when performing the difficult routine. Qualitative analysis indicated that novices not only had narrow usage of counts, which represent rhythmic information, but they also found the music annoying and counter-productive to their learning. On the other hand, the advanced dancers used various musical cues as part of their "package" strategies. While novices would turn the music off or not pay attention to it, advanced dancers were able to identify and associate certain movements with musical cues such as the high and low notes of the music, specific instrumentational highlights of the music, and rhythmic information. Musical cues were used by the advanced dancers in conjunction with other elaborate strategies, such as creating songs, by making the labels sound like the music, and "hearing" the music in their minds.

Quantitative analysis of participants' dance experiences showed no significant difference between the two groups. Although number of years of dance experience was part of how novice and advanced dancers were defined, participants defined as beginners by their usual instructors had more than a few years in jazz and other dance forms. Hence, the number of years of experience was not a true indicator of their dance ability level.

The study by Starkes et al. (1987), where expert and novice participants were age and experienced matched, revealed that their definition of expertise was based on the kind of school that the participants came from. The authors had adopted the criteria used by the National Ballet School to screen thousands of ambitious dancers as those suitable for defining expertise in ballet. The population representing novices was selected from local dance schools, which did not have a screening process for their students. The parallel to the present study was the lack of screening in the beginners' dance classes for the novice group from the University or recreational dance program versus the professional dance program which exists in the local dance schools. Beyond the differences in quality of instructional materials, advanced dancers were screened based on dance exams and the demands of the professional program.

Qualitative analysis of the strategies used by both groups did not fully support the original hypothesis that advanced dancers have different and dance specific learning strategies than novices. Even though the kinds of strategies found were similar between the two groups, it was demonstrated that advanced and novice dancers used those strategies quite differently. However, dance specific strategies were found among the

advanced dancers, specifically, the elaborate usage of musical cues, dance specific terms of labels of movements, concept of "muscle memory", chunking of dance routines in sections separated by dance specific phrases or the change in direction of a sequence within the routine, use of choreography and "highlights", and "marking" of the movements.

With respect to the strategies used when appropriately challenged, the qualitative findings supported the hypothesis that more elaborate and typical or normal strategies were used during the difficult routine and not throughout the easy one. It was further hypothesized that atypical strategies may be used when faced with a non-challenging routine. This was supported by the qualitative results which indicated that, the advanced dancers found the easy routine almost harder to learn because the movements were not representative of those they would normally perform in regular dance classes. Most advanced dancers indicated that few strategies were used to learn the easy routine because of its lack of challenge. Furthermore, the same strategies were used by the novices for both routines and, thus, supported the hypothesis that they would use similar strategies for the appropriately challenging routine and for the one that surpasses their normal challenge level. Additional analysis showed that *how* these strategies were used by the novice dancers remained the same for both routines.

SUMMARY

The purpose of Study One was to develop and validate jazz routines that were most appropriate for novice and advanced dancers. Four video-taped jazz dance routines were developed according to two dimensions: Difficulty and Complexity. Three instructors rated, on the scale of one to nine, the overall challenge level for each jazz routine with respect to how challenging they would be for novice and advanced dancers (see definitions). Results (Group x Difficulty x Complexity interaction ($F(1,4) = 10.29$, $p < 0.05$)) indicated that the two dimensions, difficulty and complexity, affected the overall challenge level for novice and advanced dancers differently. Namely, the overall challenge level for novice dancers was most affected by complexity only when the routine was easy. A ceiling effect on the overall challenge level was present for novice dancers when the routine was difficult. However, the overall challenge level for advanced dancers was most affected by complexity only when the routine was difficult. A floor effect on the overall challenge level was present for advanced dancers when the routine was easy.

Two different routines were rated by the instructors to be most appropriate for novice and advanced dancers. Easy/Complex (5.33 out of 9) was rated as most appropriate for novice dancers and Difficult/Complex (6.33 out of 9) was rated as most appropriate for advanced dancers. These two jazz routines were selected as stimuli for Study Two and was simply referred to as Easy and Difficult routines.

The purpose of Study Two was to qualitatively examine the learning strategies used by novice and advanced dancers when presented with appropriately challenging

routines. The learning strategies used by novice dancers were also examined when they were presented with a dance routine that was beyond their challenge level. Furthermore, the learning strategies used by advanced dancers were examined when presented with a dance routine that was not challenging. The criteria used for performance accuracy consisited of four components (weight shift, gestures, direction, and rhythm) which were used to quantitatively assess both novice and advanced dancers' performances.

Eight novice and nine advanced dancers participated in Study Two. Both video taped jazz routines (Easy and Difficult) were presented to all the participants. The presentation order of the routines was counter-balanced within each group. Hence, four novice and four advanced dancers were presented with the Easy routine first, then the Difficult one. Conversly, the other group consisting of four novice and five advanced dancers were presented with the Difficult routine, then the Easy one. The procedure for each presented routine was the same for all participants: a) 15 min. learning phase, b) 3 min. consolidation phase, c) recall phase (motor and motor/verbal), e) strategy recall phase, f) motor recall phase, and g) challenge rating.

Quantitative results on challenge level (Group novice-advanced) x Routine (easy-difficult) MANOVA ($F(1, 15) = 16.18$, $p < .01$)) indicated that novice dancers rated the Easy routine to be most appropriate for them (overall challenge level = 4.88 out of 9) while the advanced dancers rated the Difficult routine to be most appropriate (overall challenge level = 5.11 out of 9). A Group x Age analysis of variance showed a significant age difference between the novice and advanced group ($F(1,14) = 7.66$, $p < .05$). Subsequent analyses were therefore adjusted for age to examine whether it

accounted for a significant portion of the variance.

A Group (novice-advanced) x Routine (easy-difficult) x performance accuracy (weight shift, gestures, direction, and rhythm) x Time (immediate (Time1) and delayed (Time 2) recall) with repeated measures on Routine and Time adjusted for Age showed no significant effect of Age on performance accuracy. A significant Time x Routine interaction ($F(4, 10) = 16.11$, $p < .05$) indicated that the Easy routine was performed better on immediate recall (Time 1) while the Difficult routine was performed better on the delayed recall (Time 2). These results suggest that there was decay in the performance of the easy routine from immediate to delayed recall, on the other hand there was development in the performance of the difficult routine over time.

Follow up Group (noviced-advanced) x performance accuracy (weight shift, gestures, direction, and rhythm) One-Way analysis of variance suggested a significant difference between groups on the rhythm component of the performance accuracy criteria for both immediate and delayed recall.

A Group (novice-advanced) x Routine (easy-difficult) MANOVA on the order of presentation (easy or difficult first) and time of recall (immediate and delayed) showed no significant difference on whether the easy routine was presented first or second, or whether the recall was immediate or delayed. A Group (novice-advanced) x Dance Experience (jazz, ballet, modern, and tap) MANOVA demonstrated no significant differences between the two groups on their dance experiences. These results and past literature (e.g. Starkes et al., 1987) suggest that years of experience are not adequate criteria to distinguish novice from advanced dancers.

Qualitative examination of the participants strategy recall phase (interview) suggested that both novice and advanced dancers used similar strategies, such as counting, labelling, chunking, and imagery. However, the two groups used those strategies differently. While novice dancers used these strategies separately, advanced dancers combined the strategies and were used as a "package". Advanced dancers also included the use of musical cues, "marking" the movements, and relied on their "muscle memory" as part of their strategy "package".

Quantitative analyses supported the hypotheses that advanced dancers would perform better on the difficult routine, and novice dancers would perform better on the easy one. However, advanced dancers did not perform better than the novice dancers on the easy routine, as previously hypothesized. Possible explanations lie within qualitative data which suggested that strategies (such as counting, chunking, highlighting/choreography, and identifing) typically used by advanced dancers during the difficult routine were, in fact, not used when the easy routine was presented. In addition, the advanced dancers found the easy routine to be less interesting to learn, which could also explain why they paid less attention to the easy routine. Another explanation may be due to the scoring system employed which did not evaluate other performance factors such as quality of performance, flow of the movements, attitude of the dancers, and degree of technical presentation.

Qualitative data from the participants provided information of what kinds of learning strategies and how they were used by the novice and advanced dancers. In addition, qualitative examination provided possible explanations for the results of the

quantitative analyses. The combination of qualitative and quantitative methods provided different perspectives and furthered the understanding of learning strategies employed in jazz dance.

CONCLUSION

A critical development in the assessment of performance was the concept of equal challenge level for both experts and novices. The present study successfully eliminated the potential floor or ceiling effect of performance outcome, often found in motor learning research, by introducing different, yet appropriately challenging stimuli to both advanced and novice dancers. The issue of ecological validity was addressed in the development and validation of dance routines, which could be found in normal dance classes.

In the examination of the cognitive strategies used by novice and advanced participants within the domain of dance, the generalization of the strategies found across other domains is uncertain and thus, cannot be categorized as strategic knowledge per se. However, the domain-specific nature of the cognitive strategies discovered could be housed under procedural knowledge. As procedural knowledge could be interpreted as either selection of a movement or execution of a skill, past research on response selection has largely been based on open-skill or team sports, where strategies pertaining to selecting appropriate responses had more to do with being able to interpret abstract tactical conditions such as those in volleyball (McPherson, Dovenmuehler, & Murray, 1992), and tennis (McPherson & Thomas, 1989). Perhaps a new concern is not so much

what abstract tactical information or strategic pattern is used but more of *how* such strategies are exercised in a domain-specific fashion depending on the type of stimulus presented. The present study demonstrated the domain-specific and experience nature of the cognitive strategies that were utilized specifically with the purpose of encoding and retaining dance routines. Due to the atypical strategies found when advanced dancers were not challenged, it is important for future motor learning research within the expert-novice paradigm to recognize that the general practice of presenting the same stimuli to both groups may lead to results that are not representative of each group.

The teaching application of this study included the use of video as an effective teaching tool. When teaching dance routines or movements with the aid of video tapes, it is crucial to include the exact dimension of the space used to balance the two dimensional view captured on the video. It is also important to include both front and back views of the model to provide as much information possible to the learners. One way to achieve this is to have the model perform the movements in front of mirrors and record from the back side of him/her. This viewing angle is generally adopted by participants in actual dance settings.

Quantitative analyses indicated the novice dancers' lack of rhythmic accuracy, particularly, in the difficult routine. Qualitative data suggested that the novices did not pay attention to important musical cues. In order to aid novice dancers in the learning of new dance routines, instructors could draw attention to the use of musical cues to enhance rhythmic awareness.

Some future research directions to further the present study include: (a) To adjust

the performance accuracy criteria to better represent those important dance specific qualities such as body alignment, amplitude of the movements, style and attitude...etc; (b) To include a back view of the model on the video tape or the use of a live model; (c) To further the use of video taped materials as teaching tools; (d) To examine qualities which distinguish novice and advanced dancers; and (e) To extend the notion of appropriately challenging stimuli for experts and novices in other sports.

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Appendix A

Dear Jazz Instructors:

We are presently investigating the relative challenge level of four jazz dance routines for novice and advanced level dancers. A video tape of the four jazz routines, which is about 5 minutes in length, will be shown to you. We would like to know your rating of these routines, as well as the contributing factor(s) in the decision making process.

You will be asked to rate each routine according to two perspectives:

1) How challenging is this routine for **novice** dancers?
2) How challenging is this routine for **advanced** dancers?

For the purpose of this study, novice and advanced dancers are defined as follows:

*A novice jazz dancer is defined as someone who is currently in a beginning or entry level jazz class. The dancer may have limited prior dance knowledge in other forms of dance, however, her/his jazz dance knowledge and technique is minimal.

*An advanced jazz dancer is defined as someone who has mastered jazz techniques and performance at an intermediate/high level. These techniques may include: chaine fan kick layout, tourjete with a split, triple pirouettes, and pike jump with tour...etc. The dancer may have dance knowledge in other forms of dance. The dancer should have at least 3 to 4 years of jazz dance experience.

If you consent to participate in this study, please complete the enclosed form. If you have any questions regarding the study, please feel free to call us on the numbers listed on the consent form.

Thank you for your time and consideration.

Sincerely yours,

Dr. Wendy Rodgers

Pauline Poon

Appendix B

CONSENT FORM

TITLE: **Developing a New Method for Assessing Learning and Remembering in Dance: Equating Challenge Level Between Advanced and Beginner Jazz Routines.**

I,_____ hereby agree to participate in the research study directed by Pauline Poon, regarding developing and equating jazz routines for advanced and beginner dancers. In so doing, I understand fully all of the following statements:

1. The study will require my rating of 4 jazz routines. I understand that there will be no physical or psychological harm as a direct result of participating in this study.

2. I understand that I will watch the video taped jazz routines and rate them on their overall challenge level. I understand that I will be asked to explain the basis of my ratings, and this will be audio tape recorded.

3. I understand that the guidelines for the development of these jazz routines will be presented and I will be asked to comment on them. The session will last between 15 and 60 minutes. The session will be conducted at a mutually agreed upon time and place.

4. Participant records will be kept confidential by storing them in a locked filing cabinet at the University of Alberta. Only the researcher and her supervisor will have access to the records for the purpose of data analysis.

5. I understand that the data from this study may be used for publication, as well as educational, and academic applications. All information regarding my identity will be removed and code names where necessary will be used to protect my privacy.

6. I voluntarily participate in the study as it is described. I understand that I have the right to withdraw from the study at any time with no penalty. I understand that there is no remuneration for participating in this study.

7. I understand that if I have any questions related to any part of my participation in this project, my questions will be fully answered to my total satisfaction. I understand that I may contact either Pauline Poon (444-6223) or Dr. Wendy Rodgers (492-2677).

8. I have received a copy of this informed consent form.

_____ _____

(Participant's Name - PLEASE PRINT) **(Name of Investigator - PLEASE PRINT)**

_____ _____

(Signature of Participant) **(Signature of Investigator)**

_____

(Date)

Appendix C

Information about you...

Name:_____ Age:_____ Sex:_____

Address:_____ City:_____
Province:_____

Postal Code:_____ Telephone (home):_____ (work):_____

Dance School(s) where you are currently teaching :

_____

Dance Instruction experience:

Please indicate the **number of years** and the **level you have or currently instructing** jazz dance:

Jazz: _____yrs or _____months Level:_____

_____yrs or _____months Level:_____

_____yrs or _____months Level:_____

_____yrs or _____months Level:_____

Appendix D
Rating Sheet

Name:_____

Please indicate the **overall challenge level** of each routine for novice and advanced level dancers:

Combination 1:

Novice: 1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging
Advance: 1 2 3 4 5 6 7 8 9

Combination 2:

Novice: 1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging
Advance: 1 2 3 4 5 6 7 8 9

Combination 3:

Novice: 1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging
Advance: 1 2 3 4 5 6 7 8 9

Combination 4:

Novice: 1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging
Advance: 1 2 3 4 5 6 7 8 9

Appendix E

Dimensions Used to Determine Overall Challenge Level

1) Easy to Difficult:

Add
- Elevations
- Rotation
- Isolation
- Weight shift

Examples:

Easy:	Difficult:
1) Releve on both feet.	- Releve on one foot and hold.
2) Single chaine	- Double chaine

2) Simple to Complex:

Add
- Gestures
- Number of movements/temp
- Space covered
- Chaining sequence(s)
- Change direction

Examples:

Simple:	Complex:
1) Jazz walk	- Jazz walk with hips and arms,
double time or backwards	
2) Step touch	- Step touch with arms gestures,
changing	direction

Appendix F

Dance Elements in the **Easy** Routine:

* Total = 8 phrases of 8s; 2 counts hold, then 6 counts movements.
* 30 seconds
* Music: 4/4 time; Miles Davis "doo-bop" album titled Chocolate Chip.

1st and 2nd phrases:
- hold [facing left stage]

3rd phrase:
- Step backwards 6 times with head and shoulder movements (1-6)
- windmill arms to the floor (7,8)

4th phrase:
- head up on 2 (1,2)
- backwards roll (3,4)
- stand up (5,6)
- 2 weight transfers (7,8)

5th phrase:
- chainee to the right (1,2)
- step R, head R (3,4)
- step L, head L (5)
- 4 steps forward [R,L,R,L] (6,7,8)

6th phrase:
- chasse side [diagonally right back (upstage)] (1,2)
- pas de bourree (3,4)
- single pirouette (5,6)
- stepping out with 2 snaps (7,8)

7th phrase:
- funky combo:
    - 2 step kicks with arms out & down (R: front then back, L: back then front) (1-4)
    - 2 step kicks with arms out & up/down (R: up then down, L: down then up) (5-8)

8th phrase:
- funky camel walk:
    - with arms out side alternating (1,2)
    - with arms down alternating (3,4)
- push turn to the side (5)
- pull feet together (6)
- turn inside to the left (7)
- land facing the front both arms over your head, hand stretched (8)

Appendix G

Dance elements for the **Difficult** routine:

* Total = 8 counts of 8s; 2 counts hold, 6 counts movements.
* 30 seconds
* Music: 4/4 time; Miles Davis "doo-bop" album titled Chocolate Chip

1st and 2nd count:
- hold [face audience, down stage

3rd count:
- open with funky arms comb (4 counts):
    - hand goes R, L(1), step out to the R (2), put feet together
    - hand goes L, R, right hand to a fist, put it on your knee, throw hands up(3,4)
- 2 walks forward w/arms (5,6); triple pirouette (7,8)

4th count:
- push turn (1,2)
- feet together (3) pile (4), stand up w/arms out front(5)
- extending left leg (6); arms hold left up (7,8) [standing on right leg split]

5th count:
- chaine (1,2)
- turning Russian (3,4)
- 2 chaine (5,6)
- double pique turn (7 and); hold releve, arms up (8)

6th count:
- step L kick R (1,2)
- 2 steps turn [to the back then front] (3,4)
- on the spot w/arms [funky arms, R hand touch floor] (5,6)
- turn around to the left (7,8) [start back diagonal sequence]

7th count:
- Chaine to the R (1,2)
- rond de jambe en l'air landing on the floor (3)
- chaine to R (4)
- 1 hitch kick, turn whole body facing the opposite direction en l'air, arms 5th (5, 6 enl'air)
- head : down, up (7, 8)

8th count:
- roll diagonally from R shoulder to L hip (1,2)
- sliding across pulling both leg in at the same time (3,4)
- swing both legs to the left full circle (5,6,7); pull up on V (8)

Appendix H

Dear Jazz students:

Researchers at the Faculty of Physical Education and Sports Studies at the University of Alberta are undertaking a study to understand how jazz dance routines are learned and remembered.

As Principal Investigators of this project we are planning to conduct a videotaped session where you will be asked to learn 2 jazz routines, each 30 seconds in length. After the viewing(s) of a routine, you will be asked to perform the routine. You will then be asked to teach the routine by way of verbal descriptions and demonstrations. You will also be given an opportunity to explain how these jazz routines are learned and remembered. The entire process will take approximately 30 minutes to 1 hours to complete.

We would like to emphasize that there will be no risk of physical or psychological harm as a direct result of participating in this study. All records will be kept strictly confidential. The knowledge gained will allow the investigators to understand better how dance movements are learned and remembered.

If you consent to participate in this study, please complete the enclosed form. If you have any questions regarding the study, please feel free to call us on the numbers listed on the consent form.

Thank you for your time and consideration.

Sincerely yours,

Wendy Rodgers, PhD. Marsha Padfield, PhD. Pauline Poon, BA.

Appendix I
CONSENT FORM

TITLE: Learning and Remembering in Dance: Advanced and Beginner Jazz Routines.

I,_____ hereby certify to participate in the research study directed by Drs Wendy Rodgers, Marsha Padfield, and Ms. Pauline Poon regarding developing and equating jazz routines for advanced and beginner dancers. In so doing, I understand fully all of the following statements:

1. The study will require my learning and performing 2 jazz routines. I understand that there will be no physical or psychological harm as a direct result of participating in this study.

2. I understand that I will watch the video taped jazz routines, learn and remember them, then reproduce them in movements. I understand that I will be asked to describe the routine by way of verbal descriptions as well as motor demonstrations. I further understand that I will explain how these dance routines are learned and remembered. I also understand that I will be asked to rate the challenge level of each routine.

3. The study will last between 1 to 1.5 hours. I understand that the entire study will be video taped. The session will be conducted at either the University of Alberta, or another dance studio at a mutually agreed upon time. Transportation costs to the University of Alberta will be compensated.

4. Participant records will be kept confidential by storing them in a locked filing cabinet at the University of Alberta. Only the researcher and her supervisor will have access to the records for the purpose of data analysis.

5. I understand that the data from this study may be used for publication, as well as educational, and academic applications. All information regarding my identity will be removed and code names will be used to protect my privacy.

6. I voluntarily participate in the study as it is described. I understand that I have the right to withdraw from the study at any time with no penalty. I understand that there is no renumeration pay for participating in this study.

7. I understand that if I have any questions related to any part of my participation in this project, my questions will be fully answered to my total satisfaction. I understand that I may contact either Pauline Poon (444-6223) or Dr. Wendy Rodgers (492-2677).

8. I have received a copy of this informed consent form.

_____ _____

(Participant's Name - PLEASE PRINT) **(Name of Investigator - PLEASE PRINT)**

_____ _____

(Signature of Participant) **(Signature of Investigator)**

_____

(Date)

Appendix J

Dear Parents or Guardians:

Researchers at the Faculty of Physical Education and Sports Studies at the University of Alberta are undertaking a study to understand how jazz dance routines are learned and remembered.

As Principal Investigators of this project we are planning to conduct a videotaped session where your child will be asked to learn 2 jazz routines, each 30 seconds in length. After the viewing(s) of a routine, your child will be asked to reproduce them in movements. S/he will then be asked to teach the routine by way of verbal descriptions and motor demonstrations. You child will also be given an opportunity to explain how these jazz routines are learned and remembered. The entire process will take approximately 30 minutes to 1 hours to complete.

We would like to emphasize that there will be no risk of physical or psychological harm to your child as a direct result of participating in this study. All records will be kept strictly confidential. The knowledge gained will allow the investigators to understand better how dance movements are learned and remembered.

If you consent to having your child participate in this study, please complete the enclosed form. If you have any questions regarding the study, please feel free to call us on the numbers listed on the consent form.

Thank you for your time and consideration.

Sincerely yours,

Wendy Rodgers, PhD. Marsha Padfield, PhD. Pauline Poon, BA.

Appendix K
CONSENT FORM

TITLE: Learning and Remembering in Dance: Advanced and Beginner Jazz Routines.

I hereby certify that _____(child's name), for which I am the parent/guardian, is allowed to participate in the research study directed by Drs Wendy Rodgers, Marsha Padfield, and Ms. Pauline Poon, regarding developing and equating jazz routines for advanced and beginner dancers. In so doing, I understand fully all of the following statements:

1. The study will require my son/daughter learning and performing 2 jazz routines. I understand that there will be no physical or psychological harm as a direct result of participating in this study.

2. My child will watch the video taped jazz routines, learn and remember them, then reproduce them in movements. She will then be asked to describe the routines by way of verbal description and motor demonstrations. I further understand that my child will explain how these dance routines are learned and remembered. This will be taped auditory. She will also be asked to rate the challenge level of the routines.

3. The study will last between 1 to 1.5 hours. My child and I understand that the entire study will be video taped. The session will be conducted at either the University of Alberta at a mutually agreed upon time. Transportation costs to the University of Alberta will be compensated.

4. Participant records will be kept confidential by storing them in a locked filing cabinet at the University of Alberta. Only the researcher and her supervisor will have access to the records for the purpose of data analysis.

5. My child and I understand that the data from this study may be used for publication, as well as educational, and academic applications. All information regarding my child's identity will be removed and code names will be used to protect his/her privacy.

6. My child voluntarily participates in the study as it is described and will not receive any remuneration pay during the conduct of this study. Further, my child and I have the right to withdraw from the study at any time with no penalty.

7. I understand that if I or my child have any questions related to any part of my participation in this project, my questions will be fully answered to my total satisfaction. I understand that I may contact either Pauline Poon (444-6223) or Dr. Wendy Rodgers (492-2677).

8. I have received a copy of this informed consent form.

_____ _____

(Participant's Name - PLEASE PRINT) **(Signature of Participant)**

_____ _____

(Parent/Guardian 's Name - PLEASE PRINT) **(Signature of Parent/Guardian)**

_____ _____

(Name of Investigator - PLEASE PRINT) **(Signature of Investigator)**

_____

(Date)

Appendix L

Information about you...

Name:_____ Age:_____ Sex:_____

Address:_____ City:_____ Province:_____

Postal Code:_____ Telephone (home):_____ (work):_____

Institution(s) where you are currently enrolled in a dance course(s):

Institution	**Area of Dance** (jazz, ballet, modern, tap..)
_____	_____
_____	_____
_____	_____

Dance experiences:

Please indicate the **number of years** and the **level you are in** with respect to the following dance forms:

Jazz: _____yrs or _____months ____hrs/wk Level:_____

Ballet: _____yrs or _____months ____hrs/wk Level:_____

Modern:_____yrs or _____months ____hrs/wk Level:_____

Tap: _____yrs or _____months ____hrs/wk Level:_____

_____ _____yrs or _____months ____hrs/wk Level:_____
(other)

_____yrs or _____months____hrs/wk Level:_____
(other)

Appendix M

Rating Sheet

Name:_____

Please indicate the how **challenging** this routine is for you:

Routine 1:

1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging

Routine 2:

1 2 3 4 5 6 7 8 9
Not Challenging Very Challenging

Appendix N

Advanced dancers' mean scores and standard deviations on easy and difficult routine for immediate (Time 1) and delayed (Time 2) recall on performance accuracy criteria (weight shift, gestures, direction and rhythm).

Routine	Dependent Variable (Performance Accuracy)		Time 1 M	Time 1 SD	Time 2 M	Time 2 SD
Easy						
	Weight Shift	(we)	17.14	4.11	16.92	4.31
(out of 22)	Gestures	(ge)	16.56	4.51	16.86	4.18
	Direction	(de)	16.08	4.27	19.25	6.13
	Rhythm	(re)	15.17	6.39	13.89	5.67
Difficult						
	Weight Shift	(wd)	16.75	5.61	19.25	4.87
(out of 27)	Gestures	(gd)	18.61	6.07	16.53	4.54
	Direction	(dd)	19.25	6.13	17.47	5.21
	Rhythm	(rd)	13.78	5.59	12.78	6.22

Appendix O

Novice dancers' mean scores and standard deviations on easy and difficult routine for immediate (Time 1) and delayed (Time 2) recall on performance accuracy criteria (weight shift, gestures, direction and rhythm).

Routine	Dependent Variable (Performance Accuracy)		Time 1 M	Time 1 SD	Time 2 M	Time 2 SD
Easy						
	Weight Shift	(we)	15.31	7.71	16.03	6.56
(out of 22)	Gestures	(ge)	13.13	6.74	14.28	5.49
	Direction	(de)	14.81	6.92	15.06	6.38
	Rhythm	(re)	13.19	7.62	13.13	6.71
Difficult						
	Weight Shift	(wd)	13.54	6.18	15.11	5.96
(out of 27)	Gestures	(gd)	14.68	6.21	15.61	5.95
	Direction	(dd)	15.54	6.59	15.54	6.48
	Rhythm	(rd)	7.21	4.93	5.43	5.86